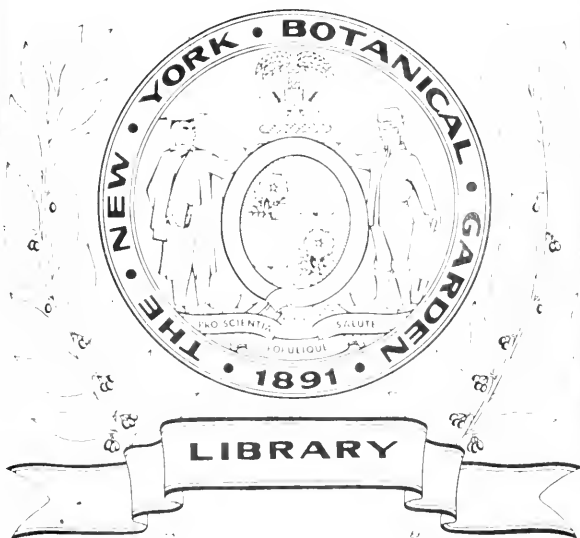


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TABLE OF CONTENTS.

VOLUME IX.

ORIGINAL COMMUNICATIONS :

Article	Page
I. On the Vine Mildew. By Hugo Von Mohl. (Second Memoir)	1
II. Some Account of the Genus <i>Hedychium</i> . By N. Wallich, M.D., F.R.S., Knight Commander of the Royal Danish Order of Dannebrog. (Reprinted from the <i>London Journal of Botany</i> , by permission of Sir Wm. Hooker; with a few alterations by the author.)	11
III. Notes made on Visiting some Gardens, between the 7th and 11th of September, 1853. By Robert Thompson	28
IV. Observations on a Form of White Rust in Pear-trees. By the Rev. M. J. Berkeley, M.A., F.L.S.	48
V. Botanical Notes on the Mildew of the Vine and Hop. By the Rev. M. J. Berkeley, M.A., F.L.S.	61
VI. Remarks on the Scientific Objects and Uses of Plant-houses. In a series of letters to Professor Fürnrohr, editor of the <i>Flora</i> , and inserted in the Volume for 1853. By Professor Von Martius, Director of the Royal Botanic Garden at Munich. (Translated and abridged from the German by Dr. Wallich, F.R.S., Foreign Member of the Horticultural Society)	71
VII. Some Account of the Horticulture of Tacna in Peru. By John Reid, Esq. (Communicated by Wm. Reid, Esq., Rose Bank.)	99
VIII. Notice of a new Chinese <i>Spiraea</i> (<i>S. Reevesiana</i> , fl. pl.?) discovered at Foo-chow-foo. By R. Fortune	109
IX. On the prickly-fruited and double-flowered Strawberries. By Professor L. C. Treviranus. Read before the Association of Naturalists for the Rhenish Countries and Westphalia in May, 1853. (Translated from the German by Dr. Wallich, F.M.H.S.)	110
X. A brief Sketch of the present state of the Question relative to the Vine Mildew. By Dr. C. Montagne	112
XI. On Structures for Horticultural Purposes. By R. Errington, C.M.H.S., Gardener to Sir Philip de Malpas Grey Egerton, Bart., F.H.S., Oulton Park, Tarporeley, Cheshire. (Communicated February 12th, 1854)	129
XII. On the Cultivation of Hyacinths in Glasses. By the Rev. W. B. Hawkins, F.H.S. (Read at a Meeting of the Society, held March 21st, 1854)	131

Article	Page
XIII. Historical Notes on the Introduction of various Plants into the Agriculture and Horticulture of Tuscany: a summary of a Work entitled—"Cenni storici sulla introduzione di varie piante nell'agricoltura ed orticoltura Toscana." By Dr. Antonio Targioni-Tozzetti. Florence, 1850	133
XIV. An Abstract of Meteorological Observations in the Garden of the Society; in continuation of those published vol. vii. p. 138. By Robert Thompson	195
XV. An effectual and unexpensive mode of Protecting Wall-trees from Spring Frosts	205
XVI. Ascertained Effects of the Winter of 1853-4 upon Exotics cultivated in the Gardens, &c., of Great Britain. Compiled from various sources	207
XVII. Report on a Trial of the Dutch Method of forcing Apricots. By Mr. W. Tatter, Gardener in the Royal Gardens of Herenhausen, near Hanover. (Translated from the Allgemeine Garten Zeitung, of Berlin.)	248
XVIII. Analysis of a Chinese Work on Husbandry and Botany. By Sir John Francis Davis, Bart., K.C.B., F.R.S., Fellow of the Horticultural Society. (Presented to the Society with the original work.)	257
XIX. On the Vine Mildew. By Hugo Von Mohl. Translated by the Rev. M. J. Berkeley. (Third Memoir.)	264
XX. American Plants. By Mr. John Saul, Nurseryman, Washington City, D.C., United States	272
XXI. Suggestions for employing Evergreens as a Winter Decoration in Flower-Gardens. By Messrs. Standish and Noble, Nurserymen, Bagshot. (Communicated September 16, 1854)	275
XXII. Pine Culture in South Wales. By W. P. Ayres, C.M.H.S.	278
XXIII. Notes on Pears, with reference to the Sorts enumerated in the Supplement to the Catalogue of Fruit-trees published by the Horticultural Society. By M. De Jonghe of Brussels	287
XXIV. How to Regenerate our Fruits. By Mr. T. Rivers, F.H.S., Sawbridgeworth	292
XXV. Notes on Pears received in the Autumn of 1854, from M. de Jonghe, of Brussels, and from Mr. Langelier, St. Héliers, Jersey. By R. Thompson	299
NEW PLANTS, &c. FROM THE SOCIETY'S GARDEN:—	
1. <i>Pinus Royleana</i>	52
2. <i>Nycteria selaginoides</i>	53
3. <i>Linum grandiflorum</i>	55
NEW ESCULENTS RECEIVED IN THE GARDEN OF THE SOCIETY:—	
1. <i>Oxalis tuberosa</i>	57
2. <i>Gesnera esculenta</i>	58
3. <i>Tropæolum tuberosum</i>	59
4. Poireau d'été petit de Brabant	60
5. Poireau jaune de Poitou	60
PROCEEDINGS AT MEETINGS OF THE SOCIETY from June 28, 1853, to December 5, 1854	
	Page i.—lxxix.

ORIGINAL COMMUNICATIONS.

I.—ON THE VINE MILDEW. By Hugo Von Mohl.*

(Second Memoir.)

IN bringing the subject of the Vine Mildew again before the public,

I have to plead as a sufficient excuse, partly its importance, and partly the circumstance that my former observations instituted in September 1851† were restricted to the more advanced form of the disease, whereas during the present year I have had an opportunity of examining the malady from the first period of its appearance, and, in consequence, of tracing more completely the influence of the fungus upon the vine. During the last two years, the disease was first observed, as well in the Tyrol as in Italy, after the vines had blossomed, and the ovaries had begun to swell. In the present year the malady appeared, if not sooner in point of time, still at an earlier period as regards the development of the vine, for in consequence of the cold wet unfavourable weather the vegetation was many weeks behind that of former years, so that at the time of writing this (on the 29th of June) all the vines at this place are not yet out of flower. Amici wrote to me from Florence on the 8th of June, that vine branches were brought to him the day before from the country, whose tendrils and unopened blossoms were infested with the fungus. The first diseased vines which I met with were at Venice on the 15th of June, on which day only a few scattered blossoms were expanded. The vines of the Botanical Garden as well as the vineyards of Murano exhibited the disease, though only to a small extent. The peduncles and divisions of the blossoms, more especially, were infested with the fungus, which existed, though in small quantities only, on the bark at the lower end of this year's shoots, and also on the leaves and tendrils. I had doubtless overlooked

* Translated from *Botanische Zeitung*, Aug. 19, 1853.

† See this Journal. Vol. VII. p. 132.

the presence of the fungus for some days, but the mode of cultivation of the vines in practice there, on high trellises, is even with the help of a ladder unfavourable to constant observation. The whole spring was unusually wet, and both immediately before and after the appearance of the disease the rain fell in torrents every day. This extreme moisture combined in June with a rather high degree of temperature (72.5° Fahr.) was doubtless favourable to the development of the fungus, for news of the eruption of the malady arrived from different parts of the continent a few days after. The malady, which had been observed ten days previously, first occurred to me at Bozen on the 23rd of June, already very generally diffused and in a higher state of development than at Venice, for not only the larger discoloured spots, covered with mould, of which I have spoken in my former memoir, appeared on the bark of the new shoots, and the leaves were in part sensibly powdered with white dust; but the fungus was not rare on the young ovaries which had attained two or three times the magnitude they had when the blossoms were first expanded, whereas at Venice two days previously they were still free.

Whether this early irruption of the disease is attributable to the unusual moisture of the present year, or whether it was simply observed at an earlier period than last year, because of the greater attention paid to the subject, must be left for future inquiry.

In consequence of the very great economical importance of the cultivation of the vine in Italy, the malady has naturally engaged during the two last years the attention of many of the best observers in the country; and in several places, as at Florence and Venice, commissions have been established for its investigation. The principal point of contention to which these inquiries have given rise, and which in a certain quarter has been carried on with more vehemence than was quite seemly, is the question whether the vines themselves are diseased, and the fungus is a consequence of the disease; or whether, on the contrary, the vines themselves are healthy, and the disease is the consequence of the influence of the fungus on the plants, and carried by means of the parasite from one plant to another.

In my former memoir I had remarked that in consequence of the morbid appearances connected with the presence of the fungus being confined to the outer strata of the green coloured organs, and in particular to the outer coat of the bark, the

vegetative powers of the vines had suffered no essential injury, and that consequently it was to be hoped that the health of the plants would not be impaired the following year, since the inner coats of bark as well as the wood appeared sound in that respect; so that, in general, only such parts were injured as must naturally perish in the course of the ensuing winter. This supposition that the general health of the vine had suffered no injury has been fully established in those districts which I have lately examined (as also appears from information transmitted from every part of Italy), though they have suffered more or less during the two previous years, for the development of the shoots of this year has been most luxuriant, and the plants exhibit as vigorous a vegetation as can be seen anywhere. In this respect not the least difference can be found between those vines which have never suffered from the malady and those which have been its victims for one or more seasons.

My observations of this year agree also with those made in Switzerland, in this respect, that as regards the physical conditions of the locality, the geognostic character of the subsoil, the dryness or moisture of the place, the exposure to different quarters of the skies, &c., no definite relation could be found between any of them and the appearance of the disease. Greater differences of site cannot be imagined than between the vineyards of Murano which are planted in a constantly wet soil, situated but a few feet above a subsoil saturated with sea water, and those situated in the plains of the country from whence I write, where a channel is formed between every two rows of vines, which are frequently watered in summer; or again, between those on the dry southern precipices of our steep mountains, ascending to a height of nearly a thousand feet. Still in these different localities the vines were in some places spared, in others, during the last year, diseased to the total annihilation of the vintage, and all of them exhibited during the past May and June a diseased growth. Single plants, also, were often shown me by the proprietors which the year before were diseased to a very high degree, but this year were perfectly sound, and the contrary. When, as was the case in some peculiarly damp situations, as Murano, the vines had suffered from the influence of exuberant moisture, and their leaves had in consequence assumed a yellow tinge, such plants were so far from being more palpably affected by the fungus, than those which looked perfectly sound and green, that on the contrary they were frequently altogether free. These circumstances render it altogether

improbable that the vines are suffering from a general disease, in consequence of which the local morbid phenomena and the fungus make their appearance.

Far less are the vines affected by a local malady; for, as is proved by the phenomena which I am about to relate, the fungus does not appear on parts of the plant already impaired by disease, but on the contrary on perfectly sound organs, and the disease of the tissues begins precisely at those spots to which the fungus adheres by especial organs of attachment. Here then the connection is so clear between cause and effect, between the agency of the fungus and the disease of the plant, that the opposite view, which is not confirmed by a single positive fact, appears to me to be flatly contradicted.*

The only circumstance which can be adduced in favour of the predisposition of particular vines for disease, and one which has been much noticed in Italy, is that certain varieties of vine are more subject to be attacked than others, those for instance the skin of whose grapes is soft and the pulp juicy, while those with a firmer skin and harder flesh are spared. This, however, may be put aside as regards a peculiar susceptibility in the varieties just mentioned, inasmuch as the harder grapes, in consequence of the toughness of their tissues, present a greater resistance to the attacks of the fungus.

Independently, however, of the question whether the grape-disease is the consequence of a general indisposition of the vines, one of great importance arises, viz.: whether in consequence of the mildew the general health of the vines is impaired. This, as said above, was not in the remotest degree the case in Italy, but it appears from the Journals of last year, that in many more Southern districts, as in Madeira, the vines perished. It is conceivable indeed that the attack of the fungus may produce such

* This notion, that the vines are diseased only in consequence of the attack of the fungus, is most expressly defended in the report of the commission appointed by the Venetian Institute, whose reporters were Prof. Visiani and Dr. Zanardini (*Rapporto della commissione nominata dall' I. R. Istituto Veneto di scienze, lettere ed arti per lo studio della malattia dell' uva*; in *den Atti dell' I. R. Istituto Veneto, &c.* Tom. IV. Serie II.) It was of immense practical importance to give currency to this view, since the proprietors fancied that they had a remedy against the disease, in cutting the vines down to the ground, and the consequent renovation of the shoots, a process, however, which entailed a certain loss for some years. The Venetian Institute therefore received with thanks my letter printed in the Official Gazette of Venice of the 1st of June of the current year in which I stated the accordance of my views in this respect with those of Dr. Zanardini.

a disease in the bark, and so derange the physiological functions of the leaves, that the plant may for a time be prostrated, though possibly the notion that the vine is irrecoverably lost may be premature. It is, however, difficult to judge of the matter at a distance.

I proved by experiment during the course of this year, as in Switzerland in the preceding season, that the fungus does not spread from the vine to any other plant. Similar fungi, indeed, occurred commonly on other plants, as on roses, partly before the vines exhibited any symptoms of disease, but none of these appeared to me to be identical with *Oidium Tuckeri*.

As regards the connection indicated above of the fungus with the cuticle of the green organs, and its power of producing disease; if clear notions on the subject are desired, we must not choose for examination those parts which are thickly covered with the fungus, but those in which it appears under the form of a delicate arachnoid web, scarcely perceptible under a lens. It is a matter of indifference, in this point of view, whether the bark of the green branches be chosen, the tendrils, the peduncles of the bunches, the integuments of the closed flower-buds, or the young fruit of but one or two lines long, provided the leaves are excepted.

With respect to the extension of the fungus on its first appearance, it must be considered as altogether local, for it occurs in insulated specks, which send out radiating threads from their circumference, and so becoming confluent, gradually cover, more or less completely, the surface of the organs which are attacked. On the branches the parasite occurs regularly on the lowest and oldest internodes; large spots covered with the fungus appear on these, and, at a later period, on the intermediate internodes, while the upper internodes (as is at present universally the case here) are altogether free. The fungus often spreads to the ovaries from the peduncles, which are already attacked before the blossoms expand, since the threads of the Mycelium, a short time after the corolla falls, creep over the nectary and involve the berries, commencing at their base. Meanwhile new centres of development arise from which the fungous web commences, caused probably by the oval vesicles or spores, which are produced at a very early period of growth upon the erect threads, and which germinate very readily and are found widely dispersed over every part of the plant, as for instance on the ovaries soon after the fall of the blossom, and then mixed with pollen grains.

The threads of the Mycelium* creep constantly in a horizontal direction, adhering most accurately to the cuticle. While these are yet at a considerable distance from one another (Fig. 1) we perceive that they are branched in a pinnate manner; and since these branches are repeatedly divided in the same manner, in consequence of their crossing, the whole assumes the appearance of a net, which in a short time loses its regularity from the incursion of neighbouring threads. They have in consequence a tendency to adhere not only to the matrix, but also to each other (Fig. 3) where they cross; so that except strong magnifying powers be used, an appearance arises as if the branches were far more numerous and irregular than they are in reality.

In the older portions of the threads which lie in the middle of the fungal spots, the fructifying branches begin to show themselves at a very early period, springing out on their upper side in a vertical direction, but not always perfectly rectilinear. While the creeping threads are divided into long articulations by distant and obscure septa, the upright threads are always distinctly jointed. They pass from a tolerably cylindrical to a clavate form (Fig. 4) showing a greater quantity of protoplasm in the upper cells, but especially in the last. This at a later period swells out into an oval form, and is separated by a distinct septum, a greater or less number of little vacua being first formed in the protoplasm (endochrome). During the past spring, I found almost without exception, only a single oval utricle at the tip of each thread, whereas in the autumn of 1851, two or three were generally present, forming a little necklace. I have already remarked in my former treatise, that the size of these fallen utricles is subject to great variation, and must therefore be used with some circumspection in the distinction of species.

The connection of the fungus with the matrix is, as was before mentioned, of especial moment as regards the theory of the disease. To make this connection clear, we must examine the

* The investigation of the Mycelium must be made with light reflected from above, for which purpose nothing is better than Lieberkühn's mirror. It is self-evident that such spots must be chosen as are protected from every cause of injury, or otherwise the tender threads will infallibly be damaged. It appears probable that this simple and obvious precaution has been neglected by Trevisan, who asserts with much earnestness (*Sulla origine delle alterazioni che osservansi alla superficie delle parti verdi nelle viti affette dal bianco dei grappoli. Osservazioni di Vittore B. A. Trevisan. Padova, Ottobre, 1852*), that fungi never grow on the sound cuticle, but always on already diseased patches.

earliest state of the fungus on the bark of the branches and tendrils, or on the young fruit. These organs appear after various degrees of the evolution of the fungus, perfectly green, but for the most part numerous brown specks are visible on the organs affected by the fungus even with the naked eye, but more certainly with a lens. Such specks must be chosen for examination, for those parts which are in a more advanced stage of decay, in which the specks have become enlarged, are useless for this purpose; in consequence of which, in my earlier investigations, in which I had before me the later stages of disease, the relations in question were not satisfactorily explained. Thus much is now clearly established: amongst the youngest threads of Mycelium, where they radiate on all sides from the margin of the spots, the cuticle retains its normal green; amongst the older parts of the threads, on the contrary, little brown specks (Fig. 1 & 3, *a a*) are visible. That this appearance is not accidental (for indeed the dead and fallen hairs, for example, on the under side of the nerves, leave little specks) is at once clear, when a part of the cuticle is placed under the microscope, already covered with the network of the threads of the Mycelium, for in this case the dots occur with the greatest regularity only beneath the threads of the fungus, and therefore arranged after the fashion of a net. A good lens will exhibit this phenomenon, but perfect conviction can be obtained only by means of the compound microscope, employing for the purpose an objective fitted with Lieberkühn's mirror and adapted for opaque objects, since we can then see the most delicate threads and the connection of one spot with another.

If we examine the specks more accurately, which is best done with transmitted light in extremely thin horizontal slices of the cuticle, we perceive that the threads of the fungus have on their under side, exactly corresponding with each brown speck, an irregular lobed process, by which it is firmly attached to the epidermis (Figs. 2 & 4, *b b*). Those processes which are nearest the tips of the threads of the Mycelium are frequently as colourless as the threads themselves, but most of them have assumed a brown tint with which a diseased state of the epidermal cells with which they are in contact is constantly combined. The contents of these cells become brown and contract irregularly, while the walls themselves acquire a similar tint which is deeper in those which are lateral. This degeneration of the tissue, which at first is confined to the cells in immediate contact with the processes, seizes at a later period also the neighbouring cells to a greater or

less extent. In this manner there arise upon the berries little knots which are perfectly visible to the naked eye, and on the branches the large brown spots described above.

There can be no doubt, that we have in these processes the points from whence the parasitic fungus exercises its baneful influence on the vine, as it is in contact with them that the cuticle becomes diseased, inducing the destruction of the outer layers of bark, and in the berries preventing the further growth of the skin, and in consequence of the continued undisturbed growth of the pulp, the rupture of the fruit. At the same time the most certain proof that the disease of the vines does really proceed from the fungus is afforded by these relations, and more especially in the above-described series of phenomena.

I have already stated above that the leaves are not eligible for this purpose. The processes and brown spots are not produced on the firm cuticle of the upper surface of the leaves, nor have I found them in the interstices of the veins of the under side, but only upon the cuticle of the veins themselves, where, however, their examination is very difficult, in consequence of the thickset hairs with which the veins are clothed. Connected possibly with this protection against the attacks of the fungus, which the parenchym of the leaves enjoys, is the fact, that the growth of the leaves, even when thickly coated with fungus, is not impaired; the parenchym of the leaf does not become brown like the outer strata of bark, and the nourishment of the plant, at least according to the investigations recorded above, seems to remain normal.

The first discoverer of these processes was Dr. Zanardini, at Venice, who on the 19th of July, 1851, made a communication respecting them to the Venetian Institute, and gave them the name of *fulcra*. I cannot, however, agree in many respects with the description which is given of them with reference to the observations of Prof. Visiani, in the above-mentioned report of the Venetian commission. Visiani believes that he has discovered that they penetrate into the epidermal tissue after the fashion of roots. This I have never been able to establish, but I find, on the contrary, the cuticle perfectly entire (as Amici asserts, who, however, appears not to have recognised these organs), and the processes themselves attached only superficially and in many cases even separable together with the threads of the Mycelium (Figs. 4. *b b*) without injury. In a second point again I cannot confirm the observations of Visiani. He asserts, that at the place where the processes spring from the underside of the threads, from two to



Various states of the Vine Mildew

four branches are given off in a radiating manner, like runners, which in turn develop new processes and a similar ramification; so that in this way the reticulate mode of branching and the quick development of the Mycelium is connected with that of the processes. A glance at Figs. 1, 3 proves that the mode of ramification is very different, observing a different law, and in no degree connected with the situation of the processes.

That the extension of the fungus during summer (independent of the immediate growth of the Mycelium) is ascribable to the dispersion and subsequent ready germination of the oval utricles, seems beyond all doubt. On the contrary, I was unable to discover where they are deposited through the winter, in what condition they are, and how the first development of the plant takes place in spring. One would imagine *à priori*, that they pass the winter on the bark of the last year's shoots, or more especially on the buds, and so when they expand are ready to germinate on the young branches. I have, however, no express observations on these points; only thus much is certain, that, as was before remarked, the disease commences on the inferior internodes. Whether the spores retain their form, or it is the already developed Mycelium which endures the severity of winter, is a point worthy of further investigation. In this respect the new fruit discovered by Amici is of the highest importance. He found, in October, 1851, that individuals of the oval utricles of *Oidium Tuckeri* enlarge, assume a yellow tint, acquire a cellular structure, and contain hundreds of extremely small elliptic somewhat curved spores, furnished with a little nucleus at either extremity. It is possible that these spores, developed late in the autumn, live through the winter, and in the following spring give rise to the new invasion of the fungus. The investigation of this matter is attended with no little difficulty on account of the extreme smallness of the spores. In September, 1851, I did not find this form of fruit in Switzerland, whether in consequence of the season not being sufficiently advanced, or that it is produced only in southern climes, points which must be decided by fresh observations. Cesati found similar fruit in Piedmont, on *Oidium Tuckeri*, and I have just seen it in Bozen on an allied species, on the leaves of hops, whereas Amici was led to its discovery in the vine, from the investigation of an *Oidium* on the common gourd with the same kind of fruit. Should further investigation afford any key to this difficulty, I shall not fail to return to the subject.

BOZEN, June 29th, 1853.

II.—SOME ACCOUNT OF THE GENUS HEDYCHIUM. By N. Wallich, M.D., F.R.S., Knight Commander of the Royal Danish Order of Dannebrog.

(Reprinted from the *London Journal of Botany*, by permission of Sir Wm. Hooker; with a few alterations by the author.)

THE genus *Hedychium* is exclusively East Indian, consisting mostly of exquisitely beautiful and sweetly fragrant plants, which flower in profusion during many months of the year, and especially during the wet season. They delight in moist and shady mountain valleys, from China, where Rumphius was told they grew wild, and the Malay islands and peninsula, where the first species was discovered by that inimitable observer, and others were afterwards added; to 30° north lat. in Western Hindustan, where they are found at Mussuri and on the Suen Range, according to Royle. In the intermediate countries they are met with on the coast of Tenasserim, on the banks of the Irawaddy, in Assam, very profusely on the Kasia (or Kasiya) and Kachar ranges,* in Sikkim, and in Nipal; less munnerously in Kamaon: also in Malabar and on the Nilgirries. Beyond their ornamental, horticultural uses, for which they are eminently qualified, being scarcely exceeded by any of our garden and stove favourites, I am not aware of their possessing any marked medicinal or other virtues. Dr. Royle mentions, in his *Natural History of the Himalayan Mountains*, p. 385—a rich treasure, not to be met with elsewhere, of useful and important information, and of curious and successful research in matters of history and literature connected with his subject—that a warm aromatic root, called Seer, Suttee, and Kupoor-kuchree, in the bazaars of Northern India, is produced by *H. spicatum*, the *Sidhuoul* of Mussuri, and that it may perhaps be the *Sitta ritte* mentioned under the Lesser Galangal, by Sir W. Ainslie.† Rumphius, as well as Valentyn (probably from the

* This is the correct mode of spelling those names, according to the high authority of the Boden professor of Sanscrita at Oxford, Mr. H. H. Wilson. The first is derived from the Sanscrita *Kasa*, being the tall wild Sugar-reed (*Saccharum spontaneum*), so common on the plains and lower hills of Hindustan. The second name cannot be reduced to any Sanscrita word; *Kachar* is Hindi, and implies land lying along rivers, liable to inundation, and of easy irrigation.

† Dr. O'Shaughnessy's *Bengal Dispensatory*, p. 652, quotes this observation from the above work. In a memoir just published by Professor

former) informs us, that the flowers of *H. coronarium* are worn by the Malays behind the ears, or as garlands among the hair, for ornament, and that they will perfume a whole room with their fragrance; further, that it is stated in some Malay grammar, that they are used symbolically to denote great promise, by their ample spread and beauty, but equal inconstancy by their delicate and quickly evanescent texture. Both those authors give *Gandasuli* or *Suli*, as the Malay name of that species. According to Mr. Hasskarl, all the Malayan species have that name. The distinguished traveller and author, Mr. J. Crawford, informs me that, in the Malay language, *Ganda* (as does its Sanscrita primitive) denotes smell or odour; and *Suli*, a corruption of *Suri*, in Javanese, a "woman of rank, a queen:" the entire word meaning Queen's perfume (see also his recent, most valuable Dictionary of the Malay language). In Nipal all the species are called by the general term *Lutisa-soa* (the last term meaning *flower* in the Parbuttea language).

In his splendid work on Monandrian Plants, Mr. Roscoe notices a very old remark of mine, that no plants are more subject to changes than those belonging to our genus. This applies equally to their wild and cultivated state, and is a constant source of trouble and perplexity to those who wish to study them in their native places of growth, or in gardens; and the dried specimens are still more difficultly examined, owing to the delicate fabric of the flowers, and generally (though not always) to their colours being lost. A good many species have in consequence been enumerated and described, which have no reality, and are sometimes not even entitled to the subordinate rank of varieties, so that my present humble attempt has consisted chiefly in reducing, under the banners of a moderate series of species, what preceding authors, myself notably included, had, as I now think, needlessly and unwarrantably multiplied. In proof I may mention, that I have myself been often deceived by the freaks and versatility of form and colours in these lovely flowers, and even the stature and whole appearance of the plants I had before me, and have had

Theodor Martius, on a series of duplicate specimens of drugs from the Indian Department of the late Exhibition, presented to the University of Erlangen by the East India Company, mentions "*radix Hedychii spicati*." No native names are given; but the drug is assimilated to *Zedoary*, and somewhat to "*radix Martelli*" of commerce. *Die ostindische Rohwaaren-sammlung*, p. 9.

successive drawings made of them, imagining that they were specifically distinct, whereas they were in reality one and the same plant, only arrayed in various fancy guises. Now, all this may no doubt be ascribed to my own want of discernment. I am consoled however by finding, that the immortal Roscoe has been similarly misled in many instances; and my friend Dr. Hooker has also several varieties among the exquisite sketches of *Hedychium*, made by him on the spot. Few species only admit of being somewhat rigorously defined; the rest slide suddenly, or by gradations, into each other, so as to elude all endeavours to fix them with any sort of botanical precision. The fact is that, like other very natural groups, ours point-blank refuses to disclose the exact limitations of its members, and leaves the systematising botanist to grope his way through the maze as best he may. Probably there exist in reality but a very limited number of distinct species; the problem to be solved being, which are those species? Botanically speaking, the genus may be called poor,—such, at least, I believe it will be pronounced hereafter; although to the horticulturist and florist it is exceedingly rich, abounding in transient forms, shades, and varieties. In the meantime I have followed the beaten track, leaving the subject to be taken up by abler hands than mine, who may have favourable opportunities for studying it. I attribute the cause of the great variableness alluded to, to the facilities of multiplication by the rhizomas or roots, and of propagation by the ordinary means of seeds, which the plants produce not unsparingly; and also perhaps to the natural intermixture of varieties of the same species. Thus far only can I admit of any cross-breeding (if indeed it can be so called) taking place in that part of the globe, where most of my years have been spent. Amidst the natural facilities—I had almost said inducements—which the amazing luxuriance of an Indian vegetation frequently offers for the production of mule breeds, scores of genera crowding their species together into a narrow area of only a few square yards, their pollen transported by winds, animals, and other means, among the hundreds of vegetable occupants: never have I seen a single instance of a hybrid plant. For the validity of this assertion I appeal, without hesitation, to my brother labourers in the field of Indian botany. There, at least, nature repudiates diversifying her creation by means which would violate the sanctity of the process of fecundation. I can imagine that two plants, specifically different *sensu botanico*, may mix together and produce a third, similarly

constituted species; but in that case I should very strongly suspect, that all three formed in reality only one truly natural species. Indeed, the appearance of such a mule-like plant would argue to me, that there was lurking a false species somewhere or other in the genus. I crave forgiveness for this little digression; it is made with hearty and profound deference to those names, which support a contrary opinion on the subject.

If I have failed in my endeavours to clear the way for future inquirers, it has certainly not been for want of opportunities while I was in India, or of means of verifying species during the latter five or six weeks—such as are not often enjoyed, and for which I feel deeply grateful. I have been permitted to borrow, first, the whole series of specimens in the East India Company's and Sir J. E. Smith's herbarium in the possession of the Linnean Society; secondly, the entire series in the matchless herbarium of Sir W. Hooker; thirdly, the noble collection both in extent and preservation (many specimens nearly as beautiful as in their fresh state!) formed by Dr. Hooker in Sikkim, and conjointly by him and Dr. Thomas Thomson on the Kasia hills, accompanied by all the drawings of the genus made by the former in both countries; fourthly, a number of beautiful sketches made for the late Mr. J. F. Cathcart, during his visit to Sikkim, by Luchmum Sing, an exceedingly clever Hindu painter formerly attached to the Calcutta Botanic Garden; fifthly, Dr. Thomson's small collection of species found in the north-west mountains of Hindustan; sixthly, all the specimens in Dr. Lindley's herbarium; and seventhly, two-and-twenty drawings belonging to the Museum of the Hon. East India Company (three presented by Dr. Hamilton, one by Dr. Wight, and eighteen by myself). I have further had the freest possible access to the specimens in the Banksian Herbarium (*salve magnum nomen!*) and those in Dr. Horsfield's collection, likewise preserved at the British Museum; and lastly, my friend and successor Dr. Falconer has, with the utmost readiness, furnished me with a copy of my entry of the genus in the manuscript Catalogue of the Calcutta Garden.

I have considered it my duty to refer to and quote, though not according to strict priority, all the authorities to which I had access, not wittingly omitting any, though some might perhaps have been dispensed with, as affording only repetitions of specific characters; and in regard to such, I have not troubled myself or others with the mention of *excludenda synonyma*. My reason for citing the numbers in the Catalogue of the Indian Herbarium,

and the Company's drawings, is that others may be able to refer to and consult them if they wish it; but I have not thought it at all necessary to copy the names of collectors from the former.

HEDYCHIUM.

A. *Coronariæ*. Spica plus minus arcte imbricata.

1. *H. coronarium*; foliis oblongo-ellipticis subtus pilosulis, bracteis ovatis, infimis aliquando apice foliaceo-expansis, tubo corollæ semi-exserto, laciniis interioribus lanceolatis vel ovatis, labello latissimo subquadrato obtuse bilobo subsessili, stamen paullo superante.

H. coronarium, *Koen. in Retz. Obs. Fasc. iii. p. 73. Rosb. in Asiat. Research. xi. p. 325. Ej. Fl. Ind. ed. Carey, i. p. 9. Erot. Bot. ii. p. 95. t. 107. Bot. Mag. xix. t. 708. Rose. in Linn. Trans. viii. p. 343. t. 20. f. 6. Ej. Monandr. Pl. n. 51*. Wight, Icon. vi. p. 17. t. 2010. H. spicatum, Bot. Cab. vii. t. 653.—Gandasulium, *Rumph. Amb. v. p. 175. t. 69. f. 3**

β. floribus lutescentibus.

H. flavescens, *Carey apud Rose loc. cit. n. 50. Bot. Cab. viii. t. 723. Wight, l. c. p. 17. t. 2008, 9. Bot. Mag. t. 2371 exclus. synonym.*

H. chrysoleucum, *Bot. Mag. t. 4516. Lindl. et Part. Flow. Gard. i. p. 110, t. 77.*

H. coronarium, *Bot. Cab. vi. t. 507.*

γ. floribus intense luteis.

H. urophyllum, *Bot. Cab. xviii. t. 1785.*

δ. staturâ floribusque maximis.

H. maximum, *Rose. l. c. n. 52.*

ε. foliis angustis, spicis abbreviatis, *Blume.*

ζ. foliis infra sericeis, *Blume.*

WILD in many parts of the East Indies in moist shady situations on mountains, or in rich grassy plains, and producing a constant succession of flowers from May until October. The normal form, with pure white flowers scarcely tinged yellow at the centre, seems to belong exclusively to the Malay Archipelago, and perhaps to the islands and countries still more to the eastward; and is that which is most commonly found in the gardens throughout Hindostan, being a great favourite with all classes of

* As neither the pages nor the plates of Roscoe's Monandrian Plants are numbered, I give the numbers in the synoptical table prefixed to the work, being from 47 to 63 inclusive, and belonging to seventeen species.

natives, as well as Europeans. It deserves to be noticed that another white flower, still more universally cultivated and equally fragrant, the *Gardenia florida*, is called Gandarāja (the King's or regal perfume) in Sanserita, as our plant, as we have mentioned already, is denominated Queen's perfume. Variety β in Nipal; Simla, *Thomson*; Sikkim, *Jos. Hooker*; Kasia, *Hooker, Thomson*, and *Griffith*; Hills in or near Assam, *Mrs. Mack* and *Griffith*; Dindygul, *Wight*; Concan, *Law*; Ceylon, *Walker*; Tavoy and Mergui, *Griffith* and *Gomez*; Malacca, *Blume*; Cochin-China? *Finlayson*; γ Kasia, *Hooker* and *Thomson*; δ Nipal; Sikkim, *Hooker*; ϵ Province of Bantam in Java. *Blume*; ζ Province of Cheriban, Java, *Idem*.

Roxburgh observes very justly in his *Flora Indica*, that *H. coronarium* is a most charming plant, throwing out a profusion of large, beautiful, and fragrant flowers during many months of the year; that is, throughout the rainy season. This remark applies more or less to the whole genus, the plurality of its members being exceedingly handsome and sweetly perfumed; some to a still greater degree even than our present species. What I believe to be the type of the species, having almost pure-white flowers, with a pale yellow tinge towards the throat, does not grow wild in Nipal; at least I never found it there; but it is much cultivated in the gardens of Bengal, where it is a common practice to pull out the flowers from the spike as they open in succession, which they will continue doing for weeks together, and putting them in water or wearing them as ornaments.

2. *H. flavum*; foliis oblongis glabris, bracteis ovatis, tubo corollæ plus dimidio exserto, laciniis exterioribus anguste linearibus, interioribus oblongis cuneatis, stamine labellum subrhomboidum bilobum acutiusculum subæquante vel paullo superante.

H. flavum, *Roxb. Fl. Ind.* i. p. 8. *Wall. Cat. Herb.* n. 6542. *Bot. Cab.* vii. t. 604. *Rosc. Mon. Pl.* n. 48. *Bot. Mag.* t. 3039. WILD on the Kasia Mountains, *Roxburgh*.

As far as I know, this is a good species, and entirely confined to the range named above; nor have I seen it vary. It is smaller than *H. coronarium*: the flowers decidedly so. The filament is mostly a little shorter than the lip, sometimes slightly longer. The specific name correctly indicates the colour of the flower.

3. *H. ellipticum*; foliis ellipticis, spicâ fastigiata, bracteis laxiuscule imbricantibus, corollæ tubo dimidio exserto, limbi interioris,

exteriore angustissimo brevioris, laciniis cuneatis, stamine labellum lanceolatum acute bifidum bis superante.

H. ellipticum, *Hamilt. in Rees. Cycl.* xvii. n. 2. *Rosc. Mon. Pl.* n. 55. *Bot. Cab.* xix. t. 1881.

WILD in Nipal; the Mountains of the Province of Kamoon at an elevation of 3000 to 4000 feet, *Strachey* and *Winterbottom*; Sikkim, at 4000 to 5000 feet, *Hooker*; Kasia, *Hooker* and *Thomson*.

The spike is remarkably fastigiate, even before the expansion of the flowers, which are white with orange-coloured stamen; or yellowish, always so in their declining stage. The species is among the less common in Nipal.

4. *H. thyrsiforme*; foliis ellipticis lucidis subtus vaginisque pilosulis, spicâ subelongatâ squarrosâ bracteis cylindraceo-convolutis recurvis valde approximatis, tubo corollæ tertiâ parte exserto, limbi interioris, exteriore angustissimo brevioris, laciniis lineari-cuneatis, stamine labellum ovale acute bifidum, nunc fere indivisum bis superante.

H. thyrsiforme, *Hamilt. l. c.* n. 4. *Rosc. Mon. Pl.* n. 56.

H. heteromallum, *Bot. Reg.* ix. t. 767.

WILD in Nipal; Sikkim, *Hooker* and *Catheart*.

Like the preceding, this is a very distinct species (ah, si sic omnes!), and is readily known in all the stages of the inflorescence by the closely approximated, cylindrically convolute or piped, and gently recurved bracts. The flowers are white throughout. It is very common in Nipal.

B. Spicatæ. Spica elongata. Bracteæ distantes, patulæ.

5. *H. spicatum*; foliis lato-lanceolatis, bracteis planis vel leviter convolutis tubo dimidio brevioribus, limbi laciniis linearibus stamineque labello ovato obtuse bilobo breve unguiculato brevioribus, interioribus latioribus.

H. spicatum, *Hamilt. l. c.* n. 3. *Royle, Nat. Hist. Himal.* p. 357 et 358. *Bot. Mag.* xlix. t. 2300. *Hook. Exot. Fl.* i. t. 46. *Rosc. l. c.* n. 48.

β. trilobum; spicâ pauciflorâ, bracteis convolutis unifloris, lobulo brevi cuspidato in sinu labelli.

H. trilobum, *Wall. Cat.* n. 6554.

γ. acuminatum; bracteis convolutis subunifloris, labelli lanceolati lobis acuminatis.

H. acuminatum, *Rosc. l. c.* n. 47. *Bot. Mag.* lvii. t. 2969. *Bot. Cab.* xviii. t. 1795.

WILD in Nipal, growing everywhere both on hills and valleys : Kamoan ; Chalk Rocks of Mussooree, *Royle* and *Thomson* ; the Suen range in 30° N.L., at an elevation of 6—7000 feet. *Royle* ; Sikkim, at 5000 feet, *Hooker* ; Kasia, *Hooker*, *Thomson*, and *Catheart*. The varieties are seemingly found in all these places indifferently.

This is the commonest *Hedychium* in Nipal, where it blossoms during six months of the year. The flowers are white ; in var. γ yellowish, with orange claw and stamen. β was originally introduced into the Calcutta Garden in 1817, by the Hon. E. Gardner, and afterwards observed by me in the great valley of Nipal, but sparingly.

6. *H. venustum* ; foliis lanceolatis, spicâ nutante, bracteis subconvolutis unifloris, laciniis limbi linearibus, labello lanceolato acute bifido stamen superante, capsulis villosis.

H. venustum, *Wight Ic.* vi. p. 17. t. 2012.

H. cernuum, *Wight, ibid.* t. 2011.

WILD in Coorg ? *Wight* ; Nilgerries, *Id.* and *Hawtayne*.

The authority of Dr. Wight as a systematic botanist is far too grave to be easily set aside on any occasion ; but on the present I venture to differ from my friend, by uniting his two species into one. I place comparatively little value on the form of leaves or petioles in this genus ; and the floral leaf is often seen long-petioled, in cases even, where they are ordinarily almost sessile. The perfectly drooping spike is characteristic, as also, as far as I know, the villous capsules. I believe I had the species very many years ago, from Archdeacon Hawtayne, and it was entered into the Calcutta Garden catalogue for *H. acuminatum*. I omitted to take notice of the particular direction of the spike.

7. *H. villosum* ; foliis lanceolatis breviter petiolatis, spicâ elongatâ densiflorâ, bracteis 1—3-floris, calyce tuboque dimidio exserto villosis, laciniis limbi linearibus labelloque oblongo bilobo stamine dimidio brevioribus, antherâ minutâ sagittatâ.

H. villosum, *Wall. in Roxb. Fl. Ind.* i. p. 12. *Rosc. l.c.* n. 56.

WILD in Nipal ; Kasia, *Old Collectors*, and besides, *Griffith*, *Hooker*, and *Thomson* ; Hills in Assam, *Mrs. Mack*.

The very minute sagittate anthers is a permanent character, which at once distinguishes the species from all others. The spike is long and cylindric ; or oval, with flowers altogether larger. This latter state is well represented in *Roscoe's* figure ;

the former I had drawn and engraved many years ago, as mentioned by that author. They differ not even as varieties I believe.

8. *H. gracile*; glabrum, omnibus partibus minutissime glanduloso-punctatum, foliis ovato-lanceolatis acuminatis, bracteis binis convolutis unifloris tubo parum brevioribus, laciniis limbi lobisque labelli fere bipartiti linearibus, stamine valde porrecto.

H. gracile, *Roxb. Corom. Plants*, iii. p. 48, t. 251, fig. infer. dextra (folium tantum flosque dissectus). *Flor. Ind.* i. p. 12 (*c.* nota Carey).

H. glaucum, *Rose. Mon. Pl.* n. 3.

WILD in the Sikkim Himalaya, *Hooker and Cathcart*; Kasia, *Collectors*; also *Mrs. Mack and Griffith*.

All the parts of the plant, leaves, bracts, calyx, and corolla, even the filament, are marked with copious minute, globular, brown, and semi-pellucid glandular dots, visible only under the microscope, more particularly the parts of the flower. This punctuation exists in a greater or less degree in most if not all the species. I have before me a large number of specimens in all stages, particularly those collected by Drs. Hooker and Thomson; which, although differing apparently among themselves, I am unable to distinguish even as varieties. Roxburgh's original plant seems to have been smaller than what is usual. The flowers are white or cream-coloured, with a long red stamen. In many of the specimens the spike is slightly nodding, rather it is ascending on a somewhat declined or decumbent stem; an appearance which has no value as a specific character, and which occurs very often, especially where the inflorescence is large and heavy.

9. *H. densiflorum*; glabrum, foliis ellipticis, bracteis unifloris, laciniis limbi interioribus cuneiformibus, labelli subsessilis ovato-lanceolati bifidi lobis acutis, stamine æquante, antherâ carnosâ dorso convexâ.

H. densiflorum, *Wall. Cat. Herb.* n. 6552.

Only FOUND on Mount Shivapura in Nipal, and in Sikkim at an elevation of 5—6000 feet by *Dr. Hooker*.

I am not quite confident that this is in reality distinct from *H. gracile*, as a species. The latter, however, has never been found either in Nipal, or on the mountains to the westward of it. The flowers are orange-coloured throughout.

10. *H. Gomezianum* ; glabrum, glanduloso-punctulatum, foliis lanceolatis nunc supra glanduloso-lineolatis, bracteis approximatis geminatis unifloris, calyce tuboque exsertis, laciniis limbi exterioribus angustissime linearibus interiores superantibus, labello cuneato bilobo, stamine longissimo.

H. Gomezianum, *Wall. Cat. Herb.* n. 6543.

WILD in Tavoy and Mergui, growing on trees, *Gomez* and *Griffith*.

Both Mr. Griffith and Mr. Gomez found this plant growing on trees. Dr. Hooker has occasionally seen some species in this sort of locality; Dr. Blume gives it to two of his species, and I have myself at times found decidedly terrestrial species growing both on trees and rocks. Still it is possible that our species may be really epiphytal. The spike seems to be slightly recurved or nodding, and the flowers ascending or one-sided; which appearance, if permanent, might be added to the specific character. According to Mr. Griffith the outer limb of the corolla is green, the inner white, and the stamen red or orange-coloured.

11. *H. Griffithianum* ; foliis lanceolatis acuminatissimis punctis creberrimis linearibus inæqualibus parallelis obsitis, subtus pilosis, bracteis geminatis remotiusculis unifloris calyce duplo vel triplo brevioribus, tubo valde exserto, limbi laciniis elongatis linearibus labelloque lanceolato bilobo deorsum longe attenuatis.

WILD in Kasia, *Griffith*.

There is a single specimen of this very remarkable plant in the herbaria of Sir Wm. Hooker and Prof. Lindley. The nearest affinity is certainly with the immediately preceding species (*H. Gomezianum*), of which I can imagine it possible that it may hereafter prove only a variety. Can a mistake have occurred in regard to the label, and that Kasia was written instead of Mergui? The crowded longitudinal, unequal, parallel glandular lines on the leaves, especially on the upper surface, are visible even to the naked eye. On the lower surface there is a number of long grey, easily separable hairs, which are decumbent, and deceptively accrete within their base. Further, the very long calyx and still longer tube, and the exceedingly slender divisions of the limb, all dotted with globular glands, seem to point at a decided specific distinction.

12. *H. Gardnerianum* : foliis ellipticis subtus imprimis spicâ intense furfuraceo-glaucis, bracteis convolutis 1—2-floris.

labello ovali subsessili integro vel bidentato, nunc suborbiculato, stamine longissime porrecto.

H. Gardnerianum, *Wall. Ic. Bot. Reg.* ix. n. 774 A et B. *Rosc. Monand. Pl.* n. 62.

H. speciosum, *Wall. in Roxb. Ind.* i. p. 13. *Pl. Asiat. Rar.* iii. p. 51. tab. 285.

β . labello suborbiculato unguiculato integro vel bilobo.—*Wall. et Cathcart, Ic. pict.*

γ . labello subquadrato bilobo unguiculato.

H. Roscoeii, *Wallich.*

H. aurantiacum, *Wall. Cat. Herb.* 6551.

WILD on mountains, Sikkim, at 6000 feet elevation, *Dr. Hooker*; and Kasia, *Mrs. Mack* and *Mr. Griffith.* Var. β in Sikkim; var. γ in Nipal.

This is the queen of the genus, if not of the whole order, both as regards the general aspect, the stature and foliage, and the exquisite elegance as well as fragrance of the ample inflorescence. While I write this, several large patches of the typical form are in full bloom at the Horticultural Society's Garden at Chiswick, thriving luxuriantly in the open border of the iron conservatory, without any extraordinary supply of water, and last year I saw them in equal perfection. The Hon. W. F. Strangways also states that the species has lived out of doors in Dorsetshire for three years, and flowers. What can be the reason that a plant so charming and desirable as this, is not more frequently seen in the stoves of the great and wealthy? Surely there exists not an Orchidea which exceeds it in any respect, especially in facility of cultivation. I regret to say the figure in my "*Plantæ Asiaticæ Rariores*" does by no means justice to the plant, the original drawing having been taken from the first specimen sent down to me by post, from the Kasia range, by the late Mr. M. R. Smith, nearly forty years ago. The magnificent series of specimens, even as to colour, preserved by Drs. Hooker and Thomson, with the fine drawings of the former and the excellent figure in Roscoe's work, prove that my *H. speciosum* and my *H. Gardnerianum* are identically one and the same species. I retain the latter name, being that of a very valued and honoured friend, who, himself ardently attached to flowers and gardening, has done a great deal of service to the cause of botany in its most extended sense. During a number of years in which the Hon. Edward Gardner (son of the late distinguished Admiral Lord Gardner) lived in Nipal, as the Hon. East India Company's resident at the Court

of Katmaudu, he contributed greatly to the riches of the Botanic Garden of Calcutta, and through it to the gardens and herbariums of England. It was through his local influence, and afterwards also of the late Mr. Robert Stuart's, the officiating resident,* that I was permitted to send permanent collecting parties into that country, where they enjoyed his unceasing support and encouragement; and afterwards to visit it myself during a whole year, which I spent under his friendly and hospitable roof.† Would that the cause of Natural History could boast many such Mæcenases in India and everywhere else!—The plant varies strikingly in the shape and size of the labellum, as also in the general colour of the flower, which from a bright yellow becomes pale, or changes into white with a pinkish centre in β (the only instance in our genus of that colour, with which I am acquainted), according to Mr. Cathcart's drawing. It is orange in γ . I have only given the above-mentioned varieties, as an abstract of the manifold changes to which this noble species is liable.

13. *H. Sieboldii*; foliis ellipticis subtus, bracteis convolutis remotiusculis multifloris, calyceque ferrugineo-villosis, laciniis limbi interioribus unguiculatis acuminatis, labello bipartito lobis semiovatis staminis dimidium subæquante.

H. flavescens, Lindl. in *Hort. Soc. Journ.* vii. p. 281. *Part. Flow. Gard.* iii. p. 164. n. 648. f. 311.

H. Roxburghii, Siebold in *Hort. Soc. Journ.* l. c.

NATIVE COUNTRY doubtful, perhaps Japan.

There is a beautiful specimen of this noble plant in Dr. Lindley's Herbarium, from the Horticultural Society's Garden at Chiswick. Although allied to *H. Gardnerianum*, it seems quite distinct; nor can I refer it to any other species. In the Society's Journal, *H. flavescens* is cited for it without hesitation, although quite different, as I think, in wanting the compact spike, the short stamen, etc. of that species; and from my *H. villosum*, with

* See my note to *Primula Stuartii*, Roxb. *Flor. Ind.* ii. p. 20.

† In 1820 I had the satisfaction to dedicate a very remarkable genus of plants to that distinguished benefactor of Indian Botany, which was first published in Roxburgh's *Fl. Ind.* i. p. 400, and ii. p. 317 and 318. In this second volume, as well as in my *Plantæ Asiaticæ Rariores* and the Catalogue of the East Indian Herbarium, the correct name of *Gardneria* is given (instead of *Gardneria*). Endlicher has even established a suborder of *Gardnerææ*, and in fact I long before him suggested that name for the entire natural order to which the genus belongs.

which it is likewise compared, it differs, among other points, by having the long linear anther usual in the genus. The flower is said to be of a pale yellow colour, with a bright orange-coloured filament, and emitting a spicy fragrance.

14. *H. angustifolium*; foliis approximatis bifariis oblongis basi rotundatis; spicâ sexfariâ, bracteis ternatim verticillatis 3—4-floris; labello longe unguiculato profunde bilobo obtuso, stamine valde porrecto.

H. angustifolium, *Roxb. Fl. Ind.* i. p. 11 et 82 (nota Wall.); *Bot. Reg.* t. 157 (*excl. syn. H. coccinei*). *Bot. Mag.* t. 2078 (*excl. cod. syn.*).

H. aurantiacum, *Rosc. Mon. Pl.* n. 61.

H. coccineum, *Bot. Cab.* viii. n. 705.

WILD in Kasia, *Griffith, Hooker, and Thomson*; Gualpora, *F. Hamilton*; Upper Assam, *Griffith and Mrs. Mack*; Sikkim and the low forest tract called Turraye, bordering on that country, *Hooker*; Chittagong, Ceylon? *Mrs. General Walker*.

The species, as far as I know, is confined to the eastern part of Hindustan; I never saw it in Nipal, nor had it from the westward. The leaves are rigidly bifarious, not glaucous; their base obtuse and rounded, and the sides bent down. The spike is sexfarius, owing to the flowers, disposed in whorls of threes, regularly alternating with each other; which is peculiarly conspicuous before their expansion. With exception of the colour, Roscoe's figure of *H. aurantiacum*, which I have quoted, is a perfect representation of our species. I quite agree in the remark of that author (under his *H. angustifolium*, which, however, I have expressly omitted quoting,) that the figure in Roxburgh's Coromandel Plants belongs to *H. coccineum*, while the description is that of *H. angustifolium*, it being Roxburgh's own species. I had long before come to the same conclusion in regard to his original drawing, preserved at the Calcutta Garden. No botanical author was ever more conscientiously accurate or trustworthy than Roxburgh; but in this instance an error seems to have crept in, which I attribute to his painter having drawn a plant, raised from seeds or rhizomas sent down by Dr. Hamilton from Nipal, where *H. angustifolium* does not grow, but instead of it, the nearly allied if not identical *H. coccineum*.

15. *H. coccineum*; foliis ensiformibus basi acutiusculis spicaque glaucis, nunc pube parca subtus conspersis, bracteis 3—6-floris,

laciniis limbi interioris cultriformibus, labello ovato bilobo acutiusculo ungue brevi, stamine porrecto.

H. coccineum, *Hamilt. in Cycl. Recs.* n. 5. *Royle, Nat. Hist. Himal.* p. 357. *Wall. apud Roxb. in Fl. Ind.* i. p. 82. *Bot. Reg.* t. 1209. *Rosc. Mon. Pl.* n. 58 (*exclus. syn. H. angustifolii*, *Roxb. Corom. quod ad descriptionem*).

H. longifolium, *Rosc. l. c.* n. 59.

H. angustifolium, *Roxb. Corom. Pl.* iii. tab. 251 (*exclus. descr.*).

H. carneum, *Rosc. l. c.* n. 57 (*non Careyi*). *Bot. Cab.* t. 693.

β . floribus carneis nunc fere albis, labello plicato subinfundibuliformi, staturâ proceriore.

H. elatum, *Brown in Bot. Reg.* t. 526. *Bot. Cab.* t. 856. *Rosc. l. c.* n. 63.

H. carneum, *Bot. Mag.* t. 2637.

H. stenopetalum, *Bot. Cab.* t. 1902.

WILD in Nipal; Kamoan, at an elevation of 5000 feet, *Messrs. Strachey and Winterbottom*; Sikkim, *Hooker and Cathcart*. Var. β in Nipal and Kamoan. Probably also on mountains near Ava.

I believe it to be impossible to discriminate between Hamilton's *H. coccineum* and Roxburgh's *H. angustifolium*, except in their fresh state; and after all, they may possibly be one and the same species. The former is a taller glaucous plant, with leaves generally tapering from their pointed base into an acuminate apex; they are less rigidly bifarious and the spike less sexfarious than in the latter.—*H. elatum*, *carneum*, and *stenopetalum*, are only varieties of *H. coccineum*, and I have accordingly united them under β . Roscoe's and Loddiges' *H. carneum* seems rather to come under the normal form.

16. *H. Hasseltii*; foliis lanceolatis acuminatis glabris, spicâ elongatâ patente laxè imbricatâ, spathis obtusis sericeis, fasciculis solitariis 2—3-floris, tubo corollæ limbo triplo longiore, laciniis subæqualibus lineari-lanceolatis, labelli 2-partiti segmentis falcato-lanceolatis obtuse acuminatis.
—*Blume*.

H. Hasseltii, *Blume, Enum. Plant. Javæ*, i. p. 56.

WILD in the woods of Western Java, on trees and on Mount Prahu.

Dr. Horsfield's specimens in the Banksian Herbarium seem to be either this or the next following species (*H. intermedium*,

Blume). The Javanese name of the plant is *Simpol*, and the flower is white, according to Dr. Horsfield.

17. *H. intermedium*; foliis lineari-lanceolatis ad costam subtus pubescentibus, spicâ elongatâ laxâ fasciculis solitariis-ternis subtrifloris, limbilaciniis tubo dimidio brevioribus, exterioribus anguste linearibus, interioribus lineari-lanceolatis labello longitudine æqualibus; labelli bipartiti segmentis falcato-lanceolatis obtusiusculis.—*Blume*.

H. intermedium, *Blume*, *l. c.* p. 57.

WILD on the mountains of Western Java.

18. *H. simile*; foliis lanceolatis acuminatis glabris, spicâ brevi erectâ laxè imbricatâ, spathis acutis margine inflexis sericeis, fasciculis solitariis 1—2-floris, tubo corollæ limbo triplo longiore, laciniis interioribus externis multo latioribus lanceolatis, labelli 2-partiti segmentis falcato-lanceolatis acuminatissimis.—*Blume*.

H. simile, *Blume*, *l. c.* p. 57.

WILD in Java, on trees on Mount Salak.

19. *H. Roxburghi*; foliis lanceolatis acuminatis subtus villosis, spicâ elongatâ patente laxè bifariam imbricatâ, spathis acutis villosis, fasciculis remotis subbifloris, limbo tubo dimidio breviorè, laciniis lineari-lanceolatis, interioribus longioribus basi angustatis, labelli bifidi laciniis obtusis.

H. Roxburghi, *Blume*, *l. c.* p. 57. *Hasskarl*, *Cat. alt. Hort. Bogor.* p. 51.

β. spicis densioribus fasciculis approximatis, inferioribus 4-floris.—*Blume*, *l. c.* *Hassk. l. c.*

WILD in woods on Mount Gede, in Java.

I presume that had there been anything extraordinary about the anthera (as is the case in my *H. villosum*.) so accurate and minute an observer as *Blume* would undoubtedly have noticed it, whereas he is entirely silent on the subject.

20. *H. lingulatum*; foliis elliptico-ovatis vel lanceolatis subtus glaucescentibus pubescentibus, ligulis longissimis: spicâ vix exsertâ, bracteis obtusiusculis 3—4-floris; calyce tubi dimidium vix æquante; laciniis externis linearibus, interioribus spathulato-oblongis; labello subrotundo unguiculato filamentum æquante. (Character ad descr. cit. *Hassk. concinnat.*)

H. lingulatum, Hasskarl, *Cat. alt. Horti Bogor.* p. 51. *Plant. Javan. Rarior.* p. 135.

WILD in Java.

The outer limb, according to M. Hasskarl, is yellowish, the inner white, base of the lip saffron-coloured.

21. *H. Spatnogheanum*, Wall.: foliis oblongis attenuato-acuminatis glabris, bracteis approximatis elongatis acutis convolutis calyce tuboque longissimo dense obsitis villis sericeis adpressis, laciniis exterioribus angustissimis longissimis, interioribus lanceolatis, stamine labellum bipartitum? superante, antheræ loculis basi altius solutis.

WILD in Java.

This densely villous and silky-spiked species I think is different from all the preceding five Javanese ones. I am uncertain about the labellum, as the specimen in Sir W. Hooker's herbarium has only a few flowers, which I am unwilling to disturb. The almost capillary end of one of the outer laciniae extends beyond the apex of the advanced flower-bud. The tube is villous, and nearly five inches long.

C. Siphonium. Limbi interioris lacinia postica subeucullata mucronata. Anthera leviter cristata. Calyx persistens immutatus.

22. *H. scaposum*; subacaule, glabrum, radice tuberosa, foliis fere omnibus radicalibus lanceolatis acuminatis petiolos vaginae-formes ligulâ destitutos longitudine æquantibus, spicâ bracteis subimbricantibus attenuatis, tubo longissimo, labello ovato bifido subsessili.

H. scaposum, Nimmo, *Grah. Bombay Catal.* p. 205.

Monolophus scaposus, Dalzell in Hook. *Journ.* ii. p. 143. *Wight Ic.* vi. p. 20. t. 2030.

WILD in marshes in the Southern Conean on the plains of Karle and woods of Lawanowlee, *Graham*; banks of rivulets in Malwa, *Dalzell*; Malabar, *Wight*; Ghauts, *Dalzell*; marshes from Karle to Kandola, *Jacquemont*.

With exception of the somewhat crested anther and the tuberous root, this very remarkable plant has no striking affinity in character or habit to *Monolophus*, or *Kiempferia* either, and it wants altogether the delicate texture of their flowers. To *Hedygium* it comes much nearer. Following the example first

set by Mr. Brown in his *Prodromus*, and also applied by him to the next following species, I enter our plant for the present as a subgenus, differing on the points I have noticed above. The persistent calyx crowns the capsule in the form of a curved tube, having its mouth cleft on one side, and three-toothed on the other, according to Dr. Wight's instructive and detailed plate. Both the bracts and calyx seem to me to be of a more firm substance than is usual in our genus, and the corolla, too, participates in some degree of that character. The tube is very long, the limb comparatively short, the inner much broader. Filament very short. The sheath-like petioles seem to point out at their being imbricate in the early stage of the plant, and as there are a few (subsessile ones) on the stem, according to Dr. Wight, the latter cannot properly be called a scapus. In *M. Jacquemont's* specimen all the leaves are radical. There is no ligula. Mr. Dalzell says that the plant is handsome, with white scentless flowers. The leaves, and still more the flowers, are marked with many minute glandular round dots.

D. *Brachychilum*, Brown, MSS. Labellum nanum retusum sessile. Stigma bilabiatum, labio inferiore triplo longiore.

23. H. (*Brachychilum*) *Horsfieldii*, Brown, MSS.; glabrum, foliis lanceolatis acuminatis, spicâ laxiusculâ, bracteis ovatis 2—3-floris, tubo gracili, limbi interioris laciniis lateralibus ovalibus obtusiusculis, exteriores lanceolatas acutas latitudine triplo excedentibus.

WILD in Java on Mount Prahu.

The delicacy of the flower is that of a *Monolophus*, but in all other respects our plant has the appearance of a *Hedychium*, with this striking difference, that the labellum is exceedingly small, so as to be hidden almost from sight, and consists of a very short broad concave retuse body.

III.—NOTES MADE ON VISITING SOME GARDENS, BETWEEN THE 7TH AND 11TH OF SEPTEMBER, 1853. By Robert Thompson.

HAVING an opportunity of going into the country for a few days only, I was desirous of seeing as many gardens, in certain directions, as I could. The time for seeing each was in consequence limited, and I therefore could not attempt to give full accounts of the respective places visited. But having made some notes, it was thought they might be written out for this journal, as some useful hints might be derived from them. In proceeding to do so, I must, in the first place, beg to take the opportunity of expressing my thanks to those in charge of the gardens noticed, for the trouble very kindly taken by all of them in affording information relating to horticultural proceedings.

ROYAL GARDENS, FROGMORE.

These gardens are situated about a mile south-east from Windsor Castle. The latter, although the principal royal residence, had no suitable garden for the supply of fruit and vegetables until those were established at Frogmore. Their formation commenced with the groundwork in December, 1841. The buildings were begun in the following summer, and so rapidly carried on as to admit of the wall-trees being planted in the spring of 1843. The area enclosed is about twenty-two acres, in the form of a parallelogram, the dimensions being, from east to west, 1132 feet, and from north to south 900 feet. But without interfering with the plan of the garden, about nine acres additional have lately been appropriated for the growth of various kinds of vegetables, such as Potatoes, Broccoli, &c. The total length of walls for fruit-trees is about 4600 feet.

The principal range of forcing-houses is nearly 1000 feet in length. The border in front of this is about twenty feet wide. The gravelled straight terrace walk is also twenty feet wide, and has broad margins of grass; parallel to the walk is a terrace wall, with appropriate vases. The space between the walk and terrace wall is laid out in flower-beds. Altogether this part of the garden has a grand and highly ornamental appearance, and very different from what would have been produced had the houses and walk in front been on the general level of the garden.

The range of houses do not run exactly east and west. Instead of the houses facing the sun at noon, they do so at 11 A.M. By this arrangement, a certain amount of sun-heat can be obtained earlier and continued more steadily than would have been the case had the houses been so placed as to receive the rays direct when the sun was at the greatest altitude. The intensity of sun-heat usually increases till 2 or even 3 P.M.; but as this takes place, the excessive intensity of the rays is moderated, in consequence of their falling more and more obliquely on the glass. The aspect of the houses being made to face 15° to the east of the meridian, or to the sun at 11 A.M., is therefore worthy of imitation.

The crops of Grapes, ripe and coming forward in the Vineries, were excellent. Of course the fruit in the earliest Vineries had been cut. The vines are all planted inside, four feet apart; they are pruned on the spur system. In the late Vinery, 102 feet in length and 16 feet wide, the sorts planted are Black Hamburgh and Black St. Peter's (Oldaker's). The latter were green at the time, Sept. 7th; but the vines showed an abundant and regular crop, which is likely to continue fit for use till the Grapes in the earliest vineries, and those in pots are fit to cut.

A corridor between a Peach-house and an early Vinery is allowed to partake of the heat of the latter, so that it is considerably warmer than the adjoining Peach-house. Into this warm place some branches of a Peach-tree planted in the Peach-house had been introduced; and it has been found that the fruit on these branches ripen about a fortnight earlier than those on the other part of the tree. This has been the case for several years. According to this, a Peach-tree may be so circumstanced as to produce a succession of fruit. Instead of the crop being in gathering for a fortnight at most, it might be prolonged to a month from the same tree. The branches alluded to, as being in the higher temperature, bore but a small proportion to those of the rest of the tree situated in the regular Peach-house temperature. But it may be a question whether the health of a tree would be materially affected by subjecting two equal, or nearly equal, portions of it to temperatures considerably different.

The crops of forced Peaches and Nectarines had been very fine. In the early Peach-house (fifty feet in length and sixteen feet wide), 130 dozens fruit were gathered this season from the four trees with which the house is occupied. These are planted

near the front wall, and trained on wire trellises, fifteen inches from the glass.

The sorts of Pine-apples chiefly cultivated here are Queens and Cayennes. The smooth-leaved Cayenne is preferred to the prickly-leaved. The Pine-plants are mostly planted out of the pots, in soil above a bed of leaves of oak and beech, from which the requisite bottom heat is solely derived. The soil is about a foot thick, and is composed of rich friable loam, mixed with some pigs' dung. Some of the Pine-apple leaves were four feet long, and of a very healthy dark-green colour. These were in a bed planted in October, 1852; and in eighteen months from that time the fruit will be all cut; or, if any are not then ripe, such will be taken up and ripened off in pots, in order to allow the house to be cleared, so as vines, the Black Hamburgh and Muscat of Alexandria, which are trained at the back, may have a month's rest. A mode of growing vines on a slate-shelf at the back wall of a house near the light is likely to answer well. The vines appeared to be growing in pots; but in reality they were in bottomless earthenware cylinders. The shelf is covered with good rich loam to the depth of two inches, and on this the cylinders containing the plants are placed. In this way, when the roots require to travel in quest of fresh nourishment, not being confined like those in pots, they can proceed beneath the lower edge of the cylinder, and feed on the stratum of soil placed on the shelf. Into this they emit abundance of fresh roots, capable of supplying plenty of nourishment to the branches; for the temperature of the soil on the shelf must be nearly that of the atmosphere of the house. Besides, moisture can be more uniformly applied to the principal feeders than could be the case if the roots were all confined in a pot; for, in the latter, the centre of the ball of soil is apt to get dry, and then it must be saturated by a pressure of water before it can be moistened throughout. The roots of a plant may be in soil containing just sufficient moisture, and then, all other circumstances being favourable, its fruit will be well-flavoured. That condition of soil is possible by the above arrangement; but in a pot the roots must be frequently saturated, and consequently the flavour of the fruit must be thereby deteriorated.

The Cherry-houses run north and south. The variety employed for forcing is the May Duke, Bigarreau, and Black Tartarian. The trees are forced every second year. When the fruit is gathered, they are planted out in a compartment of the garden near the houses, where they can be readily syringed and watered.

The early Cherry-house is also made to answer the purpose of a late Vinery, in which the St. Peter's variety of Grape is grown; and when the crop of this is cut, the vines are turned out, and the Cherry-trees and Strawberries for forcing are introduced.

A new sort of Strawberry (Ingram's Prince of Wales) answers well for forcing, and it also yields a second crop. Plants of this sort forced last spring, and which had been planted out of the pots into beds in the open ground, were bearing a good crop for the period of the season, September 7, and the fruit was of fine size and colour.

There are two ways by which forced Asparagus may be obtained. The established plants in beds must either be taken up and brought into heat, or heat must be applied to the beds. But the latter mode is that by which the finest shoots are produced; for the roots of Asparagus are so brittle, that it is impossible to take them up without a deal of breakage, and small shoots are the consequence. At Frogmore, pigeon-holed brickwork forms the sides of the bed, which are seven-and-a-half feet wide; the brickwork forms a cavity between the beds eighteen inches wide, and in this hot-water pipes are placed. This cavity or chamber is closely covered over, and the pipes are furnished with stop-cocks, so that heat, more or less, can be supplied to the beds, or to such of them as it may be desirable. In short, the arrangement is such, that the beds can be forced in succession.

In an Orchid-house, with a north aspect, the plants were thriving remarkably well; and in the same house a plant of *Amherstia nobilis*, which flowered in 1852, has branches extending ten feet. It has been shifted, and is likely to flower again next season. In the houses where ornamental plants are grown at each end of the principal range, *Mandevilla suaveolens*, *Allamanda cathartica*, and *Ipomœa Leari*, were in splendid condition: the healthy appearance of the foliage, the vigour of the plants, and the profusion of their flowers, were remarkable. These plants are being trained so as to contrast the colours of their respective flowers. In one of the Cherry-houses there were a number of seedling *Pelargoniums*, of the scented-leaved species, so much esteemed by many persons.

The walls for fruit-trees are twelve feet high. The trees were planted in 1843, and in seven years from that time the Pear-trees were in most instances completely covering their allotted space on either side, and quite to the top of the wall. Cherries covered the space in five years. The greater part of the trees

are fan-trained, but some are trained horizontally. It is seldom the case that summer laterals can be depended on for horizontals, and therefore one pair of branches can only be obtained in a season; but the soil in the Royal Gardens at Frogmore is so favourable, that as many as three, and in some instances four courses of horizontals have been originated in one season, and all sufficiently vigorous.

Under circumstances of management, which are fortunately less common now than formerly, a soil which proves so favourable for the growth of fruit-trees would very soon be the cause of rapidly hastening their ruin. But in these gardens they are managed on good principles; and although, in the present season, various kinds have not borne so abundantly as they were prepared to do previously to the severe frosts late in spring, yet the good condition of the trees can be easily perceived; for they are furnished with fruit-spurs at the base as well as at the extremities. This is to be attributed to the practice of preventing the excessive flow of sap to the top, by commencing to stop the summer shoots on the upper part of the tree before the lower. Were this to be neglected, the sap in these vigorous trees would rush to the higher parts so much in preference to the lower, that anything like an equal distribution would be out of the question.

There is a well-selected assortment of Pears on walls. The Van Mons-Leon le Clerc was producing an excellent crop; some of the fruits were seven inches in length. This sort requires the young shoots from spurs to be left unshortened, for on these it bears; and when they have once borne, they must be cut back to make room for others. Chaumontels were very good, as were also Glout Morecaus, on a west aspect. The Old Colmar and Crassane do not bear well, it was said, in these gardens, even in good seasons; but as these sorts sometimes bear well when old, although not readily when young, the trees just mentioned may be expected to produce better as they get older. The Brown Beurré, another old sort, on the contrary, succeeds well. Knight's Monarch Pear, unquestionably true, was very fine. It was stated that the fruit of this excellent sort continues in perfection for six or eight weeks from the time it is first fit for use. It has been kept till March in dry sand.

At this place, as well as elsewhere throughout the country, many kinds of Pears, as well as Apples, had been attacked by a sort of smut, a species of mildew of the Genus *Spilocaea*, an

account of which is given in vol. viii. p. 40, by the Rev. M. J. Berkley. It attacks the skin of the fruit; destroys the vitality of the latter, so that there is in the part of the skin affected no longer any expansion by growth, and therefore as the fruit swells the skin must crack, as is the case with the berries of Grapes attacked by the *Oidium*. The Easter Beurré and Glout Morceau Pears, and the Devonshire Quarrenden Apple, were particularly affected with this very destructive disease. It may be advisable to sulphur the trees early in spring, and occasionally in the course of the summer. For applying the sulphur in the form of powder, the best instrument is one invented by M. Gontier, of Paris. It consists of a common bellows, of very pliable leather; and on the upper side of the tube, where it should be flattened, several holes are pierced corresponding with similar ones in the bottom of a cylindrical box, which is fixed on that part of the tube. A flat spring, loaded with about an ounce weight of iron at the one end, has its other end fixed to the under side of the bellows. When the latter is worked, the spring is thereby made to vibrate and tap against the under side of the bellows near the neck of the tube; and thus the sulphur is shaken so as to pass continually through the holes, to be carried with the current of air against any part of the tree. The sulphur may also be applied by an engine or syringe, after being thoroughly mixed with water. To do this effectually, the dry flowers of sulphur must be sprinkled in the first instance with a very little water, then stirred till that moisture is diffused; by repeated sprinklings and continued stirring the sulphur will become a moist paste, capable of mixing with any desired quantity of water. Applied in either of these ways, before and after the blossoming of trees, sulphur can do no harm, and probably may act as a preventive against the attack of the above-mentioned destructive fungus.

The main part of the garden, bounded by the terrace in front of the range of forcing-houses on the north side, and elsewhere by walls, forms a large parallelogram about 760 feet from east to west by 440 feet from north to south. This area is divided into four equal portions by two walks, the direction of which is to cross each other at right angles in the centre. But here there is a fountain of polished marble, rising out of a circular basin, the latter being 30 feet in diameter. Dwarf fruit-trees are planted by the sides of the walks surrounding, and intersecting this part of the garden. Those by the walk in front of the terrace on

the north side, and likewise those on each side of the central walk running southward (correctly speaking, an hour to the east of due south), are trained on curvilinear iron trellises, 6 feet wide at the base, and 4 feet from the ground to the top of the arch. The principal ribs of this trellis are secured in stone blocks. This affords as much surface for training as an espalier 8 feet high, whilst the view is less interrupted. It is found, however, that these trellises are better adapted for Apples than Pears; for the former are naturally later in flowering, and thus escape the frosts to which the Pear-blossoms, by this mode of training, are much exposed. The trees are planted in the centre, or 3 feet from either side of the trellis. As each tree reaches perpendicularly above the top of the arch, it is cut back, and afterwards two shoots are trained, one to the right and another to the left, along the top of the curve. From these ridge-branches shoots are trained downwards on both sides, like ribs, at 9 inches apart. This mode of training requires great attention during the growing season, in order to prevent the upward tendency of the flow of sap from starting erect shoots, that would soon deprive the downward-trained branches of a due share of nourishment. The extent of training of all kinds, on walls and elsewhere, may be imagined by any one from the dimensions given; but no one unacquainted with the operations necessary to insure an equal, or as nearly an equal distribution of sap as is possible, can form an idea of the time which these operations require. If these were not so duly performed as they are in those gardens, the trees in a few years would sustain irreparable injury.

I feel greatly indebted to Mr. Ingram for his kindness in affording every facility for making the notes from which the preceding account is derived. It must not, however, be looked upon as in any way approaching to a full account of these magnificent gardens. The construction of the forcing-houses, the arrangements for heating, and many other adaptations, would require long details to give an idea of their perfection.

Windsor Long Walk is an avenue of Elm-trees, three miles long, and 150 feet wide. There are two rows of trees on each side. The distance between the trees in the side-rows is 30 feet, and that from tree to tree along the avenue is also 30 feet, so that every four trees on each side form a square 30 feet each way. Many of the trees are 80-90 feet high, especially in the lower part of the ground; but where the ground is high, towards the southern extremity of the avenue, the soil is poor and too dry for

trees thriving well. Here, however, young trees might soon be reared by deeply trenching, and introducing a quantity of fresh soil, which could easily be procured in Windsor Great Park, through which this avenue runs.

COOPER'S HILL.

The residence of SIR JOHN CATHCART. It is situated about four miles south-east from Windsor. The house and gardens are on the summit of a considerable elevation; and from various parts of the pleasure-ground extensive views are obtained, especially to the north-west, in which direction Windsor Castle is the most conspicuous object. From the north side of the grounds one can look down on Magna Charta Island, and on the whole of Runnymede.

Under the superintendence of Mr. Dods, the Gardens are being greatly improved. The soil is sandy: this and good drainage enabled Mr. Dods to exhibit Alpine Strawberries at the Meeting of the Society in November last, when none came forward from the lower and more damp situations in other parts of the country. He is also cultivating Specimen plants for exhibition. Camellias were here very healthy; *Mandevilla suaveolens*, very fine. There was a most splendid plant of *Dendrobium chrysanthum*, covered at the time when I saw it with 1700 flowers. Some of the flower-stems were 5 feet long. Conifers on the lawn appear to like the soil and situation of this airy spot. *Picea Nordmaniana* was 5½ feet high.

PORTNALL PARK.

THE SEAT OF COLONEL CHALLONER, NEAR VIRGINIA WATER.

THE gardens and pleasure-grounds at this place are noted for being exceedingly well-kept. The lawn, walks, and shrubberies, are maintained in the best possible order. The gardens containing the forcing-houses are several hundred yards from the house, and sufficiently hid from it, as well as from the pleasure-ground.

The time when these Gardens were visited, September 8th, was fortunately that which was the most proper for seeing the results obtained from a Protecting Peach-frame against a wall; and also from Peach-pits. As these modes have been highly successful, details respecting them will of course be acceptable.

The Protecting-frame placed against the Peach-wall was made by Cottam and Hallen, and is similar to the one which was subsequently put up by that firm in the Society's Garden; but the latter is only 16 feet long, and it has been found that the ends require to be glazed. The length of the one at Portnall Park is 41 feet; the ends are glazed, so that it can be entirely shut up, when necessary. It is glazed with Hartley's rough-plate glass, and may therefore be considered a very durable structure. The Peach and Nectarine trees under it have been planted four years. The crop was abundant and well-coloured.

The Peach-pit is 90 feet long; $7\frac{1}{2}$ feet wide; 4 feet high at back; the front is 1 foot 3 inches above the ground-level; and the trellis on which the trees are trained is 10 inches from the glass. There are ventilating boards, 6 inches wide, which turn on end-pivots. There is a walk close to the front of the pits; but it is laid over a border prepared for the Peach-trees. This border consists of about 9 inches of old brick-rubbish, above which there is 20 inches of soil, as is the case where the trees are planted inside the pit. The trees were covering the trellis, and were loaded with fine well-coloured fruit, which could be protected by the sashes from all vicissitudes of weather, and from most other accidents to which Peaches on the open wall are liable. To see a trellis 90 feet in length and $7\frac{1}{2}$ feet in width so richly covered with fruit, under these sashes, in the space of four years from the plantation of the trees, must have exceeded the most sanguine expectations formed of it. It may be observed, that the Peaches will not colour well far from the glass; in these pits the fruit is within 10 inches of it.

In exposed situations, wind-breaks are considered beneficial to Peach-trees on the open wall. These usually consist of walls across the border, or of hedges. In either case, the trees adjoining such are partially shaded, and consequently injured. But at Portnall Park, the part of the wall not protected by the above-mentioned Protecting-frame, had wind-breaks not liable to the objection of causing shade; for they are glazed. They are $3\frac{1}{2}$ feet wide at the base, and slant to 21 inches at the top, where they are securely fixed, and maintained in a position at right angles to the surface of the wall by iron stays.

Pear-trees on walls had been in danger some years ago, from an excess of vigour in the higher parts of the branches; but by checking the shoots there early in summer, and before those below are interfered with, a more equal flow of sap has been induced, and the trees

are, in consequence, doing well. In this locality the east aspect suits the Pear better than the west. On a north aspect Morello Cherries were very large and fine.

Strawberries are here grown on mounds. One of these is terraced, each terrace having a horizontal width of 15 inches for the soil in which the Strawberries are planted. Another mound is covered with bricks and clinkers, but not terraced. The crops on both were stated to have been equally good; but the regularly terraced mound is more easily kept clean.

In the forcing-ground, the heating is derived from one saddle-boiler and two of Rogers's. These, with their furnaces and stoke-holes, are under a circular roof of corrugated iron, which has been erected for ten years.

Besides Vineries, there are ranges of pits for Melons, Cucumbers, early forced vegetables, and also a house for Begonias and other plants adapted for affording a supply of cut-flowers in winter.

The Cucumber-pit has bottom heat supplied by cement tanks, which have been in use for upwards of eight years, and they are yet quite sound. Mr. Macqualter states, that nothing could answer better than they do for bottom-heat; and that he would as soon have them as he would 4-inch pipes for that purpose. This pit has four 2-inch pipes for top heat.

In another part of the ground there is a Vinery 40 feet long, by 16 feet wide, with a span roof, and with upright glass in front, but not at the back. One Vine covers the whole extent of roof, and appears strong enough to cover half as much more space. There is a walk $3\frac{1}{2}$ feet wide all round; and within this a stage, for bedding out plants, 3 feet from the ground.

A gravel walk, 20 feet wide, extends from the principal front of the mansion, 720 feet, in a south-west direction, and terminates with a fountain and grotto-work. The lawn bordering this walk is, on both sides of the latter, smooth and level; but from this, as if securely from a level base, a high and steep slope rises on the west side. Along this walk, on both sides, there are either marble vases or statues at every 50 feet distance, with a marble seat half-way between, and two Portugal Laurels in tubs between each seat and vase or statue. So that there is, first, a statue or vase, then two Portugal Laurels, a marble seat, two Portugal Laurels, and again a statue or vase.

Near the mansion, and south-east from it, there is an American Garden. Should it be at any time desirable to extend the

pleasure-ground in this direction, the American plants could be shifted a little farther off, to a naturally formed hollow, which would be a most eligible spot for them. There are, in the same direction, views of a lake, which has partly been formed artificially.

A Flower-garden, at some distance north-east from the mansion, is scarcely seen from the latter. It is a pleasant retired spot, rather than one calculated for display.

DROPMORE.

This place, still maintained by LADY GRENVILLE in its former peculiar style, has been so frequently noticed in horticultural publications, and so generally visited, that little requires to be said respecting it. Mr. Frost, however, pointed out a few things which may be mentioned.

The unusual quantity of rain which has fallen since the commencement of 1852 has afforded a supply of moisture to the roots of trees which they previously much wanted. Many of the *Pinus* tribe have, in consequence, made longer growths in the past season than they had in those preceding. The *Picea nobilis*, for example, has this year made a shoot 2 feet 8 inches long. The tree was planted in 1835; and its total height is 17 feet. It was not more than 6 inches high when planted out; it has therefore grown this season fully 1 foot 8 inches more than it has done on the average. A Douglas Fir (*Abies Douglasi*) is now 70 feet high; and the large *Araucaria imbricata*, 3 feet 7½ inches in circumference at 3 feet from the ground, is nearly 40 feet in height; a Cedar of Lebanon, planted forty-eight years, is about 70 feet high.

A number of standard Fuchsias, planted out in various parts of the ground, were very splendid. Their stems were 8 to 10 feet high, with heads from 4 to 6 feet in diameter. After flowering, they are spurred in and wintered in a green-house. In the spring they are turned out into places of made soil 6 feet in diameter and 3 feet deep.

HEDSOR,

THE SEAT OF LORD BOSTON, BUCKINGHAMSHIRE.

Prizes for Grapes, Pine-Apples, and other fruits, have been so repeatedly awarded for a series of years to Mr. Davis, the gardener here, that his name must be familiar to those frequenting the Society's Exhibitions. It was therefore desirable to see the gardens where these fine productions were grown.

The mansion stands on an elevated situation. From north-east to south, the views extend over extensive undulations, and are terminated in glades which recede amongst majestic woods. On the north and north-west the ground is precipitous, with the Thames in the plain below; and a canal, fed by that river, is brought almost close to the base of the steep, which is wooded, but has views through from the house.

The Garden is in rather a low situation, and partly on chalk. There were good crops of Peaches, Apricots, and Pears on walls; but Mr Davis remarked, that Pear-trees do not succeed when their roots get to the chalk. Some of the borders are therefore concreted. The Pine-pits, from which so many large fruits have been obtained, are not heated either by flues or pipes, but entirely by leaves. The latter can be obtained of the best description for the purpose, Oak and Beech, to any amount, from the extensive woods. Beds and linings of these supply both bottom and top heat for the Pine-apple plants. But great care is necessary with regard to covering. The sashes are first covered with mats, and these again with close wooden shutters. The mats are thus kept always dry; and wood being a slow conductor of heat, the latter can be sufficiently maintained without the aid of fire. The success which has attended this mode of cultivation is a proof that sufficient heat, well economised, is better for plants than a much greater amount reduced to sufficiency by dissipation.

Leaves are also used for covering Vine-borders. This serves, in the first instance, as a protection to the roots from cold; and as the leaves decompose, they afford manure. Hence the ease and success with which early forcing, more especially, can be carried on, compared with the difficulty of the process when no such covering is at command.

A curvilinear Vinery has been built for many years. Part of it was constructed of malleable iron, and the other of cast-iron: the latter has stood equally as well as the former, and it was just one-half the expense.

A number of Orange-trees was standing out in a flower-garden, along the sheltered side of which they formed a row. They had fine tops; and their stems were thick, tall, and straight. These now valuable trees were purchased about five years ago, at an oil-shop, for fifteen shillings a-piece. They were put in bottom heat; and by good management in other respects, they have attained their present excellent condition.

The small parish church is situated near the walk which winds

and slopes from the mansion to the garden. Near this church, and close to the side of the walk, there is a very ancient specimen of the common Yew, still maintaining a healthy top, and about 60 feet high. The tree now measures 28 feet in circumference, at 3 feet from the ground. The trunk is quite hollow; but fresh wood keeps forming round it. It is impossible to ascertain, correctly, the age of the tree; for the centre being gone, the annual layers cannot be counted. DUBREUIL, *Notes sur l'Accroissement des Arbres Exogènes*, mentions two Yews, in the cemetery of La Haye-de-Routot, Eure, in Normandy, one of which was 29 feet 3 inches in circumference, at a metre from the ground: and the other 28 feet 6 inches. The age of these he estimates at 1460 years, or, at all events, not less than 1400 years. Their trunks were stated to be likewise completely hollow. M. Dubreuil arrived at the above conclusion with regard to the age of the trees, by the following means: He ascertained that the annual layers of two Yews, comparatively young, growing in the same locality as those in question, averaged about $\frac{1}{10}$ of an inch; and, at this rate, he calculated the first two hundred years of the existence of the Yew. He then counted 90 concentric layers of one of the identical aged trees, and 74 layers of the other; and he found the average thickness of these layers was about $\frac{3}{100}$ parts of an inch. From these data, it was deduced that the age of these Yews was between 1400 and 1460 years. Now, if we assume that the Yew at Hedsor has grown at the same rate as those in Normandy, and allowing 20 years, which would be the proportionate deduction for its somewhat less circumference, we must conclude that it is between 1380 and 1440 years old; the mean of these would make its age upwards of one thousand four hundred years. Although there are steep slopes in its vicinity, it is evident that no material change of surface has taken place in the spot where it grows during the long period of its existence.

CLEVEDEN.

ONE OF THE SEATS OF HIS GRACE THE DUKE OF SUTHERLAND, IN
BUCKINGHAMSHIRE.

The mansion at this place was destroyed by fire in 1795. Another was built, which was likewise burned down some years ago. But a noble edifice, by Barry, is now erected. This requires the pleasure-grounds to be remodelled; and, accordingly, they are intended to be laid out in a very elegant style, judging

from the plan to be carried out, which Mr. John Fleming had the kindness to explain. The scene of operations, which were just commenced, was on the south side of the mansion. The design for an American garden is included in the plan. When completed, the effect from the Terrace, on this side, will be very fine, and the improvements in this direction will doubtless lead to others on the north side of the mansion, where there is also space for such. There is every probability that these gardens and grounds will be rendered every year more and more interesting.

HIGH GROVE.

NEAR READING, THE RESIDENCE OF J. J. BLANDY, ESQ.

After visiting Hedsor and Cleveden in the morning, I had to proceed to Calne the same day. I endeavoured, however, to see Mr Blandy's place, although the starting of the trains permitted of only a general view of it.

This place was formerly noted for its fine collection of Orchids; but their cultivation is now, in a great measure, discontinued, and ordinary stove and green-house plants are grown instead by Mr. Stanley, formerly gardener to the late Mr. Berens, of Sidcup, in Kent, and a successful contributor to the Society's Exhibition. He is cultivating a number of exotic Ferns; among which the most conspicuous was the *Cibotium Schiedianum*. This is, perhaps, the finest plant of this remarkable species in the kingdom. Its fronds measured from 8 to 10 feet in length. Some of the ferns were growing, suspended, in earthenware vases, or in pots, with holes in their sides, through which the fronds extended. The large span-roofed house has an elegant appearance. It is 70 feet in length, and, with the vestibule, the length is 100 feet; the width 30 feet.

The gardens and pleasure-grounds are well-kept. There is a collection of thriving Conifers; also good American plants; a fine *Kalmia latifolia* was 7 or 8 feet across. A geometrical flower-garden is seen north-east from the house, with the lawn sloping from the latter towards it. The flower-garden itself is level, and the outline square; but an ornamental fountain in the centre produces a good effect, that of a circular form imposed on a square base. If the fountain had been in the centre of any other figure it would not have looked so well as in that of the square; and the flower-garden, notwithstanding its gay colours, if without the fountain, would have lost much of its elegance.

BOWOOD.

THE SEAT OF THE MARQUIS OF LANSDOWNE, NEAR CALNE,
WILTSHIRE.

The mansion is situated on the south side of a hill, which slopes rather rapidly to a lake occupying the bottom of a valley, and extending through the park for more than a mile. At some distance behind the mansion the ground continues to rise, and the fine trees growing upon it form a rich back-ground, particularly when seen from the opposite side of the lake.

Great improvements have recently been made on the south side of the mansion, which, in a horticultural point of view, are so connected with the building, that some notice of it is in the first place requisite.

The mansion is built, or rather has been ornamented externally, in the mixed Grecian style. On the south front is a portico, supported by noble columns. The pediment is enriched by the family arms. Under this portico is the principal entrance. The demesne came into the possession of the present family about the beginning of the last century; and the principal alterations and improvements were carried out by the first Marquis, and under the superintendence of Adams. One wing extends 300 feet west from the main building, and is in the Italian style. It forms a screen to the stable-yard and offices behind, and contains the library, orangery, and chapel, besides offices. The chapel, which is in the centre of this wing, is surmounted by a beautiful turret tower, by Barry, which forms a resting-point in viewing this rather long line of building. The other wing runs nearly the same length to the north; the space between the two is devoted to offices, &c.

Immediately in front of the west wing is the upper terrace, extending the whole length of the wing, and about 60 feet in width. This terrace is 8 feet higher than the lower one in front, from which it is separated by a wall surmounted by perforated work in dressed free-stone, vases, &c. The lower terrace is reached by a flight of steps, and is on a level with the floor of the main body of the mansion, with the width of which it corresponds, and its length is the same as that of the upper terrace. Both are connected at the end by a raised terrace-walk, at right angles with the terrace wall, terminating in a handsome pavilion, which abuts immediately on the park, com-

manding a view of it, as well as of the parterres which lie below. The lower terrace is separated from the park by a dwarf balustraded wall, which is carried round the principal entrance, so as to form an entrance court, access to which is obtained through two handsome iron gates, with massive stone piers, surmounted by fine copies of Canova's lions, in Bath stone. The lower terrace terminates in a wall fountain, immediately over which is a fine group of sculpture, by Smith, consisting of a river god, nymph, &c. On each side of this fountain and group are circular flights of steps leading up to the pavilion above mentioned.

Both terraces are laid out in the Geometric or French style; and, in addition to the flower-beds, contain many plants of Cypress, and Irish Yews, intended for cutting into architectural shapes. The lower terrace is between 90 and 100 feet wide; and a walk runs directly up the centre, terminating at the fountain already mentioned. Cross walks intersect; and the main one of these, leading from the upper terrace, is 25 feet wide, and conducts to a flight of steps, which afford access into the park. The latter, previous to these improvements, approached too near the mansion; but now the south frontage is rendered complete by the tasteful adjuncts which have been formed by a combination of architectural and horticultural skill.

The park is extensive and well wooded; Beech appears to be the principal indigenous tree of the locality. The surface of the park is much diversified by hill and valley. A natural one of the latter, and its subordinate branches, is filled by the lake, which was made by merely damming up the bottom of the valley. The waste water flows over a much admired cascade, and, with its accompanying rocky scenery, has a very natural appearance. About 60 acres in the pleasure-grounds, adjoining the mansion, are kept under the scythe.

A Pinetum was formed by Mr. Spencer in 1850. It is arranged geographically. The species indigenous to China are together, and adjoining those of Japan; then those of Tartary, Siberia, other parts of Russia, the Crimea, Persia, Himalaya, Norway, Western Europe, Spain, the Levant, Africa. In another division we find the Conifers of Hudson's Bay, Canada, the United States, N. W. Coast, California, Mexico, and Chili, &c. Many of the species had made rapid growth in the short time in which they have been planted. A *Cupressus macrocarpa* was 14 feet high. *Cupressus Goveniana*, 9 to 10 feet high. *Pinus muricata*, 7 feet

high, had made a shoot $2\frac{1}{2}$ feet this season. A *Pinus insignis*, planted in 1838, was upwards of 35 feet. A tree of *Abies Douglassi* on the lawn measured 54 feet in height.

The Kitchen Garden, which is walled in, contains about $5\frac{1}{4}$ acres; but besides this, as the family is very large, there are 7 or 8 acres of vegetable ground, including an orchard. The subsoil of the gardens is as bad as can be, a coarse sand, with clay full of iron, and water rising everywhere to within three feet of the surface. This is owing to the substratum being rock, through the fissures of which the water rises in all directions, even to the top of the highest ground. It is very difficult to drain under these circumstances. The large percentage of iron in the subsoil is very unfavourable to vegetation, which positively refuses to grow in it. Hence a great part of the borders is artificial, made with difficulty owing to there being no suitable loam near. Loam for the Vine-borders was procured from the Downs, a distance of six miles. It is a turfy loam, moderately strong, lying immediately on the chalk.

Some of the walls are 12 feet, others 14 feet high. Their copings project 4 inches. Copings of wood, which project 11 inches, are put up over Peach-trees, &c., and at every 30 or 40 feet there are wind-breaks. By these means, and with artificial soil, very good crops are obtained. A very large Plum was growing on the walls, called the Fonthill Plum, and it is also cultivated near Bath under the same name. It appeared to be the same as Pond's Seedling. It is red and much larger than the Red Magnum Bonum. Along the sides of some of the walks intersecting the kitchen-garden, Currants and Gooseberries are trained to slight espaliers.

There are six Vineries, including a large pit for Muscats, and in all of them excellent crops are produced. The sort of Muscat chiefly grown by Mr. Spencer, is one introduced by him, and called the "Bowood Muscat." He states that it is a freer setter than the common one, grows weaker, and breaks much later in the spring. There was a fine crop of this sort in the large pit above mentioned. The earliest Vinery and two others are heated by flues; the other three by hot water. There are two Peach-houses: and three houses for Pine-apples, one of which is used as a Strawberry-house in spring. In one pit the Pine-apples are grown on the Meudon plan, and very successfully; Queens are grown by this mode to the weight of 6 lbs. and upwards, the average being 4 lbs. The winter-house has heat applied from below by

dung linings; but this, although it answers well, requires a considerable amount of labour. In the other houses the Pines are grown in pots. It may be added, that all the forcing-houses except three have been erected and fitted up under the superintendence of Mr. Spencer, and although on economical plans, yet they answer their respective purposes well. The laying and planting the terraces and Pinetum have also been done by him; and in accordance with the views of the highly respected owner of these noble domains, he is likely to go on with improvements where such are required.

MR. LYDIARD'S MARKET GARDEN

AT BATH EASTON, NEAR BATH.

Visitors frequenting the Society's Exhibitions will recollect seeing very fine Strawberries from growers in the neighbourhood of Bath. I have measured some of them fully 7 inches in circumference; and in ascertaining their merits, the judges have found it sometimes expedient to use the knife. Mr. Lydiard is one of those growers; and finding him in the fruit and vegetable market at Bath, he very kindly took the trouble to accompany me to his grounds at Bath Easton, where he pointed out his mode of cultivation, which will be seen to differ in some particulars from that usually employed and recommended.

It has been generally considered advisable not to cut off the Strawberry leaves; nevertheless Mr. Lydiard does so. Frequent renewal of Strawberry plantations have also been recommended; but at Bath Easton they remain in bearing during six, or from that to ten years.

With regard to cutting off the leaves, it must be observed that this is done, not just before winter, but immediately after the crop is gathered. Moreover, the old leaves as well as the young heart ones are not mowed over indiscriminately with the scythe: a knife is employed, so that the old leaves only can be removed, and the young and pushing ones saved. As a consequence of this mode of proceeding, in the warm soil of the locality, the plants had acquired, by the time I saw them, September 11th, a large size from the growth of fresh foliage, which had even become robust from having the advantage of all the light which the old leaves would have intercepted, had they been allowed to remain.

These young and vigorous leaves were in a condition to elaborate sap to form equally vigorous roots for supplying

abundant nourishment to the ensuing crop. After it is gathered, the knife is again immediately employed to remove all old leaves, in order to give space and light for new ones. And inasmuch as the large amount of fresh foliage, thus annually encouraged, produces a corresponding amount of new tissue, the plants are so far annually regenerated; and hence, it may be concluded, that the frequent renewal of the plantations becomes less necessary. When young plantations are made at this place, the rows are $2\frac{1}{2}$ feet apart, and the plants 2 feet from each other in the rows.

The quality of the Potato crop this season was here excellent; but the quantity deficient owing to the haulm having been prematurely cut off by the disease. The sorts chiefly grown are the Forty-fold (red), and the Goldfinder (white). From the quantity of Brussels Sprouts grown for market, it would appear that there is a class of society in Bath that can appreciate the superior delicacy of that kind of winter green. This being the case, the Early Ulm Savoy would doubtless prove an acceptable introduction to that locality: for its quality is much finer than that of the large Savoy, and approaches that of the Brussels Sprouts.

Mr. Lydiard had a span-roofed house, north and south, for early Melons. The flue is built of ashlar Bath-stone, with the exception of a few bricks near the fire. This flue is very close, and Mr. Lydiard says it stands the fire very well. The slabs with which it is constructed are 18 inches in length; those for the sides are two inches thick; and the covers, of the same material, are 3 inches thick. The joints are made with coal-ash mortar.

MONTEBELLO, BATHWICK HILL.

THE RESIDENCE OF G. H. SIMS, ESQ.

This is a very elevated spot, many hundred feet above the bottom of the valley, in which the Avon flows to Bath. It is on the east side of the city, near the top of the hill, facing the south-west, and consequently much exposed to the strong winds from that quarter. Where the garden, or rather series of terraced gardens have been formed, the ground is exceedingly steep; and if the ground made for a garden had been laid according to the original slope, the soil would have been washed down. Therefore, terrace above terrace has been formed to modify the declivity. The

terrace-walls, of Bath stone, have an elegant appearance. A walk ascends from bottom to top, through the centre of these terraced gardens, with the exception of one, which has lately been taken in from, or rather quarried out of, a part of the hill, which lies on the other side of the road, leading from Bath to Claverton.

The houses are new, and fitted up in first-rate style. Full command of heat is insured by abundance of hot-water pipes. One Vinery, for early forcing, had three 4-inch pipes in front, and four laid backwards and forwards along the floor. This Vinery is 13 or 14 feet wide, and Vines planted two months had reached in that time to the top of the house; and the wood was such as to be fit for bearing next season. A very high temperature was, of course, maintained, but the house being light, the foliage was sufficiently robust.

Melons are here grown exceedingly well. The gardener, Mr. Grant, was the raiser of the Victory of Bath Melon, with which he has taken many prizes at various Exhibitions. He grows it in a Melon-house in pots. Some of this sort was sown in the beginning of September, 1852; planted the 5th of October; commenced cutting fruit April 14th, and successively till September 11th, 1853, when I tasted one of them, white-fleshed, juicy, sugary, and rich. The Melon plants are grown in 19-inch pots, which are plunged nearly to their rims in sand, in a bottom heat of 85 degrees. The soil in the pots is all loam, but pervious, so that manure water can be supplied to the roots as required. The plants are trained with an upright stem till they reach a trellis near the glass. Every leaf, it should be observed, is encouraged on the upright stem until it reaches the trellis, and then they are gradually dispensed with. The bed in which the pots are plunged is 36 feet in length and 6 feet wide, and in this 20 plants are grown, one row of pots being plunged along the front and another along the back.

There is an Orchid-house, 64 feet in length and 16 feet wide: and in this there was a very fine collection of perhaps the healthiest plants of the kind any where to be found. On the whole, this place, from its peculiar situation, and the excellent arrangements for forcing, is becoming very interesting to horticulturists.

IV.—OBSERVATIONS ON A FORM OF WHITE RUST IN PEAR TREES.

By the Rev. M. J. Berkeley, M.A., F.L.S.

EVERY cultivator of Pears has of late years, in addition to the well known *Æcidium cancellatum*, which in certain localities has long been the pest of the Pear orchard, had to struggle against another less seemly intruder (*Helminthosporium pyrorum*, *Desm.*) which not only impairs the health and beauty of his trees, but renders the fruit, which at first perhaps gave fair promise of remuneration, perfectly unsaleable. During the early part of the past summer an enemy belonging to the animal world, under the form of a minute Acarus, was more than usually abundant, affecting not only the leaves but distorting the fruit, as represented in the *Gardener's Chronicle*, 1853, p. 420. In the course of some investigations of the mode of operation of the Acarus, which had been hard at work at my own pear trees, I observed, especially in the Marie Louise and Glout Morceau, that a great quantity of the leaves were blistered somewhat after the fashion of peach leaves when suffering from chilly weather, before their perfect expansion, but with the blisters in general more neatly defined. In many cases these blisters formed two parallel lines on either side of the midrib, but sometimes, especially when larger, they were irregularly scattered over the frond. In some cases the blistered part had become black, and in others the portion of the leaf which had protruded had fallen out so as to leave a regularly defined aperture. On inspecting the under side of the distorted leaves, the cavities were found to be lined with a thin white stratum consisting of myriads of confluent white specks, of a waxy rather than powdery appearance, and in an early stage of growth, covered with the cuticle which is loose and more or less ruptured, showing the subjacent organisms through the fissures. On examining the substance more closely, it appeared first that the vesicles of which it was composed did not occupy exactly their original position, but that the tips of the little heaps of spores had collapsed more or less from moisture, so as to produce a more or less uniform stratum like that of a *Corticium*. The mass itself consisted of ovate or elliptic hyaline bodies about $\frac{1}{4000}$ of an inch long, without any apparent sporophores, though the greatest pains were taken to discover them both by myself and Mr. Broome, to whom I had communicated fresh specimens. Here and there a spore might be discovered with a little projecting

cell often seated obliquely, so as to call to mind exactly the yeast fungus. An examination however of the youngest individuals we could find, detected extremely short moniliform threads like those of some of the more minute *Oidia*, as *O. circinans*, and it is to that genus, notwithstanding some difficulties, that we think the little parasite must be referred. At first we were inclined to consider it a *Glæosporium*, especially in consequence of the waxy appearance mentioned above, which does not exist in any recorded *Oidium*, and which is due to some gelatinous element in the outer coat of the spores, the absence of which renders the spores of normal *Oidia* pulverulent, but not only was there nothing like distinct pustules in some shape or other essential to *Glæosporium*, but the moniliform growth of the spores was decisive as to the impropriety of such an arrangement. Unless admission be conceded into *Oidium*, a new genus must be framed, which we are unwilling to do on the mere circumstance of the spores having a little more gelatinous matter in their outer walls than is usual in the genus. About the time when the parasite appeared, Dr. Montagne kindly communicated to me a somewhat similar production which had occurred in the South of France on walnut trees, consisting like this of minute white spores, none of which however exhibited any tendency to become moniliform. This he has referred to the genus *Gymnosporium*, under the name of *G. leucosporum*, to which genus I should gladly have assigned my minute fungus, but for the *Oidioid* mode of growth. It may be observed moreover that the spores of Dr. Montagne's plant strongly resemble those of the Pear Fungus, measuring $\frac{1}{3500}$ of an inch in length, a size which differs very little from that of the *Oidium*. There is however a circumstance connected with the little parasite which requires notice. When it was first submitted to Mr. Broome, he detected what appeared to be perfect asci, containing hyaline bodies of the same shape as the spores, but averaging $\frac{1}{2500}$ of an inch in length. The question at first occurred whether these had not been poured forth from the little sacs so as to form a thin white stratum, but the difference of size, though the form was identical, was against such a view, and the discovery of the moniliform mode of increase was still more decisive.* The apparent asci were no doubt individualised cells

* The production noticed by Dr. Montagne on walnut leaves was no less remarkable for the total absence of sporophores, inasmuch that, as in the pear leaf, the bodies might be supposed to have been poured out from the asciform cells but from their evident increase by the addition of new cells,

of the spongy tissue of the underside of the leaf, in which the endochrome instead of forming grains of chlorophyll had been organised into minute hyaline cells, simulating the spores of the fungus; a similar case to which occurred much about the same time in the processes into which the outer cells of the cuticle are converted in the production known under the name of *Erineum aureum*. The *Erineum* had been produced on the surface of the ovaries and in every cell, the endochrome was converted into hyaline grains resembling perfectly the spores of a true fungus. The bodies represented by Fée are probably of the same nature. A case approaching to this occurred also in the clavate cells with which *Leeythea epitea* is surrounded. The endochrome did not indeed form distinct cells, but was broken up into separate granules, as far as I could see, not invested with a membrane and endowed with very active molecular motion.

Before closing the present observations I must call attention to a very curious appearance which has this autumn accompanied *Helminthosporium pyrorum* in the gardens of the Earl of Westmoreland at Apethorpe. In the midst of the dingy patches of the fungus, white spots appeared, not only on the leaves, but also on the fruit, sometimes a quarter of an inch or even more across, resembling very closely at first sight the *Oidium*, but not blistering the leaves. On examination however it was clear that the white appearance was not due to any fungus, but merely to a disease of the cuticle itself, consisting of a sort of desquamation like that of *Lepra*, the scales however being quite microscopic. I was not able to examine this at a sufficiently early period to trace its connection with the fungus, or to study its phases properly; a somewhat similar case has occurred on Elm leaves, communicated by Mr. Broome. The matter certainly deserves further notice, as it seems more properly a cutaneous affection, than some other affections which have been so denominated. I am not prepared to say that any real injury was caused to my pear trees by the parasite, for the Glout Morceau bore an excellent crop of fine fruit, and the Marie Louise failed merely from the blossoms being injured by late frost. The peculiarly damp season may have had some share in the appearance of this new parasite, but we have

so in the walnut leaf there was a question whether the bodies might not be very minute eggs. Dr. Montagne had, as it appears, no opportunity of examining the production in a perfectly fresh state, and therefore it is possible that the structure of his plant may really be more near that of the pear leaf fungus than was at first apparent. If I mistake not the production occurs in England, though it has not been recorded.

seen so much injury arise from a little production analogous at least if not in reality very closely related, which at a certain definite time made its appearance in a particular garden at Margate, and from thence spreading over the greater part of Europe or even beyond its limits, that we are not in a position to judge of the possible importance of any parasite, merely from the effects produced during the first season in which it may be observed. The whole question of the production and appearance of these organisms is involved in mystery, but though we are unable to come to any general conclusions now, it is quite possible that the simple record of facts like the present may not be without its weight at some future day. The fungus may be recorded as follows.

Oidium bullatum, Berk. & Br. Mss. soris punctiformibus demum confluentibus epidermide primum vestitis; sporis ovatis ellipticisque minutis subgelatinosis.

The figure represents at (a) a group of the spores, either simple or more or less compound; and at (b) some of the cells of the leaf in which the endochrome is converted into distinct hyaline vesicles.

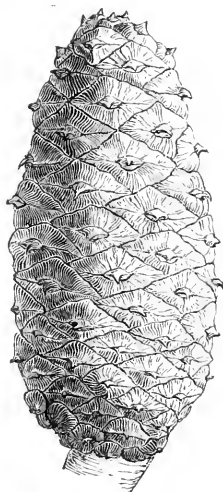


Oidium bullatum, Berk. & Br.—White Rust on Pear Trees

NEW PLANTS, ETC., FROM THE SOCIETY'S GARDEN.

1. PINUS ROYLEANA.*—*Jamieson*.

ALTHOUGH the seeds, cones, and a few loose leaves of this plant are all that have as yet reached Europe, there is no doubt that it forms a species previously quite unknown. The leaves are like those of the Scotch fir in almost all particulars, except that they are much more slender and short; and the cones, of the size of *Pinus sylvestris*, have an entirely different form, are smooth as if they had been half polished, and their scales are flat-headed, with a fine, hard, sharp mucro, very distinctly hooked back—(much more uniformly than the artist has represented in the accompanying cut).



Cone of *Pinus Royleana*.

All that is known of its history is that the fragments above alluded to were received in 1853, from Dr. Jamieson, as belonging

* *P. (Pinaster) Royleana*; foliis geminis tenuibus canaliculatis contortis divergentibus, strobilis parvis oblongis obtusis lævigatis, squamarum apophysi angustâ rugosâ lævi umbonulo duro apiculato retrorsum uncinato.—J.L.

to a noble tree, growing in Nepal at an altitude of 8—10,000 feet, and therefore perfectly hardy. A very few plants have been raised in the Garden, where they prove to be, in their seedling state, quite different from any species previously raised there. The following is Mr. Gordon's description of the materials received from Dr. Royle:—

“*Leaves*, two in a sheath, rather spreading, from 2 to $2\frac{1}{2}$ inches in length, rather broad, stiff, blunt-pointed, partially twisted, concave on the upper surface, and light glaucous green. *Sheaths*, very short, particularly on the adult leaves, ragged or torn, and partially persistent.

“*Cones*, $2\frac{1}{2}$ inches in length, and 1 inch broad in the middle, of a greyish-brown colour, oblong-conical, slightly tapering to the base, and rather blunt-pointed. *Scales*, smallest and most numerous near the base, and largest near the middle, slightly elevated in the centre, and terminating in an irregular four-sided projecting hooked point, slightly bent backwards.

“*Seeds*, very small, with a broadish wing, rather more than half an inch in length.

“*Seed leaves* on the young plants, mostly in sixes, and rather long.

“The Society received seeds of this Pine from the Honourable Court of Directors of the East India Company in April, 1853, but as very few seeds grew, it must continue to be scarce for some time. It certainly is new to our collections. Previously we had no Pine from India with only two leaves in a sheath, and very small cones.”

2. NYCTERINIA SELAGINOIDES. *Bentham in De Candolle's Prodrromus*, X. 348.—*Erinus selaginoides*, *Thunberg*.

A very pretty greenhouse annual, received from Messrs. Vilmorin & Co., under the erroneous name of *N. villosa*. It forms a broad spreading patch of pale dull green hairy herbage, arranged in the manner of a Candytuft. The leaves are linear-spathulate, and slightly toothed; the uppermost quite entire and adnate to the tube of the calyx, than which they are much longer. The flowers are arranged much in the same manner as in *Iberis*, forming a true corymb. They are pure white except the eye, which is a very deep-yellow cup fringed by an exquisitely beautiful coronet of tiny yellow hairs. The tube of the corolla is very

slender, an inch long, and nearly smooth ; the limb is flat, a little curved backwards, with 5 two-lobed equal divisions.

This may be regarded as one of the prettiest summer annuals introduced for some years.



Nycteria selaginoides.

3. LINUM GRANDIFLORUM.—*Desfontaines Flora Atlantica*,
Vol. I. p. 277.

A brilliant little annual, with large rich crimson flowers, lately introduced from Paris. It was originally found in heavy land near Mascara by Desfontaines, who called it *species pulcherrima*, as it certainly is. He described it as throwing up clusters of erect or decumbent stems, from 8 to 12 inches high, with smooth scattered leaves, of which the lowest are linear, the upper broader, narrowly lanceolate, and rough at the edge. The flowers are in loose panicles, with very large rose-coloured petals, about twice as broad as in the officinal flax. Five years ago its introduction to gardens was announced, with a good coloured plate, in the *Revue Horticole*, and great expectations were entertained that a really precious novelty had been acquired. But when young plants had been raised, they were found so unmanageable that it was doubtful whether they could ever be kept alive. In fact, many perished, and those which did flower, although realising all that had been said of their brilliancy, were dwindling and unattractive. In pots under glass they could scarcely be kept alive. Planted out, in 1853, in an open south border, they did better, but still acquired no horticultural value, a circumstance not to be wondered at in so rainy, cold, and gloomy a summer. The plant, however, is of too much importance for its cultivation to be regarded as hopeless, and therefore the following remarks by M. Ysabeau, recording the experience gained in France, will doubtless be read with advantage.—

“This pretty annual was figured in the *Revue Horticole* of November 1, 1848. The plant bears a profusion of flowers which remain long in bloom; it is consequently one which is greatly to be recommended. Since the above date it has been lost in most gardens, and notwithstanding its splendid colour and other valuable qualities, it still is only in the hands of a small number of amateurs. Messrs. Courtois-Gérard and Vilmorin imagine that they have discovered the cause of the disappearance of a plant which was very favourably received at first. It was generally believed that it should be cultivated in pure peat, or at least in peat mixed with a little vegetable mould, or common garden earth. This soil appears to be too unsubstantial for a plant which, like other *Linums*, requires much vegetable nourishment; and this nourishment not being supplied in sufficient

quantity, the plant did not ripen its seeds and eventually perished. Messrs. Courtois Gérard and Vilmorin made the experiment of pricking some plants into the open ground, in a border of light but tolerably rich soil, containing much more nourishment than peat earth, either pure or mixed. This experiment succeeded perfectly. Although sown and pricked out somewhat late, the plants are, at the present time (August 2nd), covered with flowers having well-formed ovaries full of seeds, the perfect ripening of which does not appear doubtful, judging from the good state of the plants. It is probable that the cultivation of *Linum grandiflorum* failed from the excess of precautions taken to ensure its success; if the plant had been treated the same as other hardy annuals which are sown in beds or under glass, and pricked out into the borders, it would have perpetuated itself without difficulty. Now that it is in a manner re-introduced, it will be the duty of amateurs not to allow it to disappear again from the flower garden, to which it is undoubtedly a valuable acquisition."—*Revue Horticole*, Sept. 16, 1853.

NEW ESCULENTS RECEIVED IN THE GARDEN OF THE SOCIETY.

1. OXALIS TUBEROSA.

UNDER the name of *Oca* it appears that several varieties of this tuberous plant are known in Bolivia, whence they have been brought by M. Weddell. In the spring of 1853 some tubers, about the size of a pea, were received of the *Oca Rouge* from M. Vilmorin, and were raised in a melon pit. Two of the plants were kept in the vinery; and two were planted in the glass wall. The former died to the soil about the end of September without forming tubers. Those in the glass wall continued growing till killed by frost, November 17th. Their stems had grown in this situation to the height of five feet, with a healthy dark green foliage; but no flowers were produced.

When the roots were taken up, it was found that numerous tubers had formed, some of which were fully an inch in diameter, roundish, or somewhat flattened, and having numerous eyes. The skin was smooth, in some parts of a pale straw colour, but mostly of a delicate crimson red.

The roots have been taken up with the soil adhering, and covered with dry soil, in a cool vinery. From the largest tubers strong plants may be expected, which will most probably flower. The tubers may be cut into sets like potatoes. Possibly the *Oca* may be grown so as to produce tubers in this country, perhaps in warm soil and hot seasons without the aid of glass, except to forward it in spring.

Although very imperfectly ripened these tubers possessed little of the acidity that might be expected of an *Oxalis*, and which is spoken of by M. Weddell in the *Revue Horticole* (4th series, vol. i. p. 149). On the contrary, they were pleasant to the taste, perhaps resembling unripe Spanish chesnuts as much as anything else, and being, in the opinion of persons of taste, at least equal to Rampions, as a raw esculent. The quantity raised in the Garden was too small to allow of experiments in cooking them. It is intended to grow them more extensively next year; and, as

they are likely to become of interest, the following account of them by M. Decaisne will prove interesting:—

“The *Oca* is very extensively cultivated in the temperate parts of Bolivia, where several varieties of it are distinguished. Two are known by the names of *Oca blanca* and *Oca colorada*. The Museum is indebted to M. Bourcier for the latter, which he considers superior in quality to the *Oca blanca*, although M. Weddell is of a different opinion. The *Oca blanca* is beginning to appear in our markets; it is now to be found in most greengrocers’ shops, but the slightly acid flavour of the tubers is disagreeable to some persons. This acidity may be converted into a sugary flavour by exposing them to the sun, which converts the acid into saccharine matter. This phenomenon is analogous to what goes on at the ripening of most fruits. The *Oca*, when treated in this way, loses all trace of acidity and becomes as floury as the best varieties of potatoes. According to M. Weddell the *Oca* should be exposed to the sun from six to ten days. In Bolivia this operation is performed in woollen bags, which appear to facilitate the conversion of the acid. To obtain this result, the bags should contain no more tubers than are sufficient to form a thin layer within the bag. If the action of the sun is continued for several months the *Ocas* become of the consistence and sweet taste of dried figs; they are then called *Cauí*. The *Cauí* is cooked by steam, the tubers being placed on a bed of straw which keeps them from contact with the water over which they are cooked. In Bolivia, and more especially at La Paz, the *Oca* is cultivated to double the extent of the potatoe. The price is also twice as high as that of the last-named vegetable.”—*Rev. Hort.* 4. ser. vol. 2., p. 383.

2 GESNERA ESCULENTA.

Seeds under this name were received from M. Vilmorin of Paris in the spring of 1853. The leaves proved to be narrowly oblong, about four inches and a half in length, and one inch and three quarters broad, pale green, and soft with pubescence, especially on the under side; petioles short. The plants did not flower, and died down in the beginning of October; but in the pot a number of roundish tubers had been formed, about an inch in diameter, of a whitish colour. When boiled, these tubers were somewhat farinaceous, of a transparent bluish white; but had a disagreeable bitter, like that of potatoes which have been partially greened. The seeds were sown and placed in a melon-

frame; they came up in about a fortnight, and were potted singly, when fit, in five-inch pots, in which each plant produced a great number of tubers, some of them of the size above mentioned. They are larger than is usually obtained from potatoes raised from seed, in the first season.

Having obtained tubers, two of them were kept dry for a fortnight, and then started in heat. They are now growing well and will probably flower. If the tubers can be deprived by any means of the bitter which they naturally possess, they might form an agreeable dish.—R. T.

No flowers having been produced in the Garden the real name of this plant cannot be determined. That of *Gesnera esculenta* is not to be found in works on systematical botany. That it is a stove plant seems, however, to be certain; and therefore it is improbable that, even if palatable, it will ever possess any horticultural value.

3. *TROPEOLUM TUBEROSUM*.

Although not cultivated as yet in the Society's garden this deserves mention in an account of newly introduced esculents. It produces an abundance of very pretty yellow and red pear-shaped tubers from two to three inches long; and since it is as hardy as a potatoe there is no reason to doubt its being cultivable; but it is a question whether its flavour, which is not very agreeable in its ordinary condition, can be improved in England, as it is in La Paz, its native country. Upon this subject M. Decaisne has some interesting observations to the following effect:—

“The tubers of the *Tropæolum tuberosum*, designated *Ysaño* at La Paz, require to be prepared before they become edible. Indeed when they were prepared in Europe like potatoes, and immediately after being taken up, their taste was very disagreeable. But a mode of making them palatable was discovered in Bolivia, and the *Ysaño* has there become, if not a common vegetable, at least one which is quite edible. The means consist in freezing them after they have been cooked, and they are eaten when frozen. In this state M. Weddell affirms that they constitute an agreeable dish, and that scarcely a day passes at La Paz without two lines of dealers being engaged in selling nothing except *Ysaño*, which they protect from the action of the sun by enveloping it in a woollen cloth, and straw.

“The ladies of La Paz are all very fond of the Ysaño, and in the season of the taiachas large quantities are sopped in molasses, and taken as refreshments during the heat of the day.

“It will be perceived by the preceding, and by the preparation which the Ysaño must undergo, that the cultivation of the *Tropæolum tuberosum*, and likewise that of the Ulluco, has but little chance of being successful among us, our climate being entirely different from that of La Paz, the mean annual temperature of which (50°), is, however, little different from that of Paris (51.44°). Many plants can resist intense cold in the very dry climate of La Paz, where the dryness of the air allows several Cacti to grow as on the elevated table-lands of Mexico, although the thermometer falls nearly every night below the freezing point. But such is not the case in our moist climate; for we know that a slight fall in the temperature is sufficient, either in spring or autumn, to destroy the stems of all herbaceous vegetables.”—*Revue Horticole*, Oct. 16, 1853.

4. POIREAU D'ÉTÉ PETIT DE BRABANT.

Received from M. Vilmorin, 1853.

This is an early leek, with very long narrow leaves, of a dark green colour. It is not so well adapted for a main crop as the Large Rouen Leek and some others, because, if sown at the same time, it is more apt to run to seed than they are. But a little of it may be sown for early use with advantage.—R. T.

5. POIREAU JAUNE DE POITOU.

Received from M. Vilmorin, 1853.

A very large sort of leek, some of the leaves being more than six inches broad and five feet long, measuring from the lower part of the stem; they are of a yellowish green colour. The stem blanches yellowish white, and its substance is more tender than that of other varieties. It requires to be planted farther apart than usual, owing to the size of its leaves. As it grows large and is of tender quality, it deserves cultivation.—R. T.

ORIGINAL COMMUNICATIONS.

V.—BOTANICAL NOTES ON THE MILDEW OF THE VINE AND HOP. By the Rev. M. J. Berkeley, M.A., F.L.S.

THE genus *Oidium*, a name, at the present moment, far too familiar in every country where the Vine forms an important object of cultivation, contains a heterogeneous mass of species of very various affinity, agreeing only in the circumstance of the spores, or sometimes merely of the component cells of certain threads of the mycelium being arranged end to end so as to form little necklaces. Amongst these there is a peculiar group consisting of such species as *O. leucoconium*, *Tuckeri*, &c., distinguished by their mealy appearance, though not constantly of a pure white, and developed on the green parts of vegetables. In many cases this mycelium creeps amongst the large intercellular spaces of the under surface of leaves, the moniliferous threads making their appearance through the stomata; but this is by no means constant or essential, for, as in the grape mildew, though often exhibiting such a mode of growth, they are produced with equal luxuriance on parts of the plant where there are either very few or no stomata.

Another circumstance connected with such species is, that in a variety of cases they are the certain forerunners of different species of *Erysiphe*. There are, indeed, some of these species which have never been observed to be accompanied or succeeded by an *Erysiphe*, and it is possible that such may be autonomous, but in the majority of instances, of which the hop mildew is an example, the *Erysiphe* most certainly and constantly follows or attends the *Oidium*.

Under such circumstances it was natural that a question should arise as to the character of this connection, and accordingly it has been warmly contended on the one hand that the *Oidium* and *Erysiphe* are perfectly independent, while on the other the *Oidium* is regarded as the mere mycelium of the *Erysiphe*, and it has even been hinted, though without any sufficient grounds, that the deciduous joints of its erect threads may possibly be of sexual importance. As a step towards the solution of this question, some observations,

accompanied by a figure, were published by the author of this memoir, in the *Gardeners' Chronicle*, 1851, p. 227, tending to show that in *Erysiphe communis*, as produced upon the Garden Pea, the sporangia really arose from the decumbent threads of the *Oidium*, and that in such a way as not to make it probable that this is a case of mere parasitical growth, but that the myceloid threads of the *Oidium* actually give birth to the *Erysiphe*. The illustration, if correct, is clearly of great importance; but inasmuch as it has not been received with perfect confidence, I am happy to give the annexed figure from the observations of Dr. Plomley, made perfectly independent of my own, which completely confirms the views I had taken of the matter, and sets it almost beyond doubt (Fig. 1).

The question was in this state when, in the early part of 1851, a drawing made the previous year by Dr. Plomley, illustrative of the hop mildew, was hung up in the Crystal Palace, in which a transformation of the articulations of the moniliform threads of the *Oidium*, into what were then supposed to be true sporangia, was clearly represented (Fig. 2). This transformation was precisely like that which so commonly takes place in the genus *Antennaria*, of which a few words may be said towards the close of the paper. It was not then matter of surprise so far, though it might seem *à priori* scarcely probable that the sporangia should be formed in two different ways, and when the subject was mentioned in the *Gardeners' Chronicle*, 1851, p. 467, the interest attached to it was pointed out, though there remained some difficulty about the two modes of the origination of sporangia, for the distinction between those organs and others presently to be mentioned was not at that time ascertained. The correctness of the whole was indeed called in question by Mr. F. J. Graham, in the number of the same year for Aug. 9, p. 502, but so many unexpected circumstances arise in the study of natural history, that it is seldom safe to reject altogether any evidence that may be brought forward, because it may at first appear anomalous, however wise it may be to rest in a position of more or less philosophic doubt. In point of fact, such seeming anomalies often indicate latent truths, and when cleared up throw light in the most unlooked for manner on matters which were before involved in obscurity. Recent observations have, indeed, shown that Dr. Plomley's illustration was really of much importance, and the anomalous points have been, for the most part, elucidated by the discovery that the bodies into which the articulations were transformed were not

precisely of the same nature as the sporangia, but exhibiting, independently of the mere conidia of the *Oidium*, a second form of fruit, as in many other fungi. On the 5th of September of the following year (1852), a paper was read before the Royal Academy of Georgofili of Florence, by Professor Amici, in which he reports the discovery of bodies in the grape mildew of precisely the same nature and mode of production as those in Dr. Plomley's figure. It will be found from Prof. Amici's memoir, a translation of which appeared in the last volume of this Journal, that he does not allow the above-mentioned connection between the *Erysiphe* and *Oidium*, nor indeed at present have true ascigerous sporangia been detected in the grape mildew. These bodies were not, however, found merely in the grape *Oidium*. Prof. Amici informs us in his memoir, that they had occurred in the mildew of *Convolvulus arvensis* accompanying an *Erysiphe*; and I have lately received a very kind letter, in which he sends specimens of *Oidia* bearing transformed cells, not only in the Vine and *Convolvulus*, but also on the common Gourd, the Hop, *Plantago major*, and *Trifolium pratense* (Fig. 3). He also found them on *Artemisia campestris*, but I have seen no specimen. Dr. Plomley has detected them abundantly in the *Oidium* of the rose. I had, indeed, previously seen specimens of the transformed joints in the vine mildew, for Cesati's *Ampelomyces quisqualis*, *Rabenhorst*, n. 1669. b. published in 1852, is undoubtedly the same thing, though the bodies contained in the cells are rather smaller than in Amici's specimens (Fig. 4).

This, however, is not the only name which has been imposed upon these bodies, as though it were still the fate of fungi to have generic importance ascribed not only to their mycelia but even to their separate organs; for Ehrenberg, who received his specimens from Amici himself, gave them the name of *Circinobolus florentinus*; and *Riess in Hedwigia*, 1853, p. 23, tab. III. fig. 2. d, e, f. has given to similar bodies in *Erysiphe lamprocarpa*, the name of *Byssocystis textilis*.

In the early part of 1853, Tulasne published in the *Botanische Zeitung* some admirable observations on the genus, without, however, having had the advantage of seeing any of Amici's specimens or those published by *Rabenhorst*. His remarks refer principally to two species belonging to the genera *Uncinula* and *Phyllactinia*, of *Léveillé*, in which he found the bodies in question, to which he gave the name of pycnidia, as being identical in function and essential structure to those which he had before so characterised

in lichens (*Mem.* p. 108), but differing from those observed by Amici, and from all that I have myself examined, in resembling exactly the true sporangia and in being furnished with similar appendages. In no single instance has this been the case in the species I have had the opportunity of observing, and though in some cases the bodies were globose, this was not by any means their normal form, far the greater part being pointed above. Like M. Tulasne, neither myself nor Mr. Broome have ever seen the pycnidia surmounted by a necklace of utricles, but in every case rising immediately from the mycelium very much as represented in the figure in the *Hedwigia*, quoted above, but frequently also from one of the swollen cells of the decumbent mycelium; there is, however, no reason to doubt that such is the case, for the practised eye of Amici could scarcely be deceived; and Dr. Plomley's figures, made two years before those of Amici, and verified by the numerous observations of 1853, are altogether confirmatory of the fact. In one or two instances in Cesati's specimens (Fig. 4, b), Mr. Broome found a few delicate threads at the base of one of the pycnidia attached to its walls, but by no means emulating those of the sporangia. The bodies contained in the pycnidia do not differ much in size in the different species. In the grape mildew they are (at least in Amici's specimens)* ·0004 of an inch long, in that of the gourd, *Plantago major*, the hop, and *Convolvulus arvensis*, ·0003, and in *Trifolium pratense* they vary from ·0002 to ·0004.

No one has at present seen these bodies germinate, unless indeed, as Amici suspects, they are what Professor Pietro Savi "saw vegetate under the microscope, believing them to have issued by a regular longitudinal dehiscence from the utricles of the moniliform filaments which had been supposed to be sporangia." Now it does not seem very probable that Savi could have made such a mistake, as the pycnidia are differently coloured, the colour indeed often extending down the peduncle; and the observations which I have now to record resting entirely upon the repeated and long-continued examination of Dr. Plomley, confirm what is advanced by the Italian Professor. Both in the hop and vine mildew, he found that the joints of the moniliform threads, though not transformed into pycnidia, contained a number of distinct bodies, and not merely a granular endochrome. In both cases their number appeared to be normally about 300, but in the hop mildew

* In Cesati's specimen the contents of the pycnidia did not exceed ·0003 in.

occasionally they did not exceed 50. In both cases alike these bodies germinated very readily when kept moist between two slips of glass (Fig. 5), in one instance even producing an approach to fertile threads and swellings of the articulations, the forerunners, as Dr. Plomley believed, of true (Fig. 6) sporangia or pycnidia, it is uncertain which, as either may arise from the decumbent threads. But not only did they germinate when separated from the utricles either by pressure or spontaneous rupture, but even where no rupture in the walls of the mother-cell took place they germinated *in situ*, pushing out the shoots of mycelium through the walls. In many instances, little germs were produced from the cells, which call to remembrance the observations which Tulasne has made on the germinating threads of Puccinia (Fig. 7), though it perhaps may not be certain that they are of precisely the same relative importance. In many cases the fallen utricles adhered together in considerable masses, germinating and producing an inextricable plexus of spores, myceloid threads, &c., and so giving rise to the curdy appearance which is often observable in hop mildew, and indeed in most allied forms of mildew. These facts are very curious, for the utricles themselves have often been observed in a state of germination, as figured by Amici, and by Dr. Plomley himself in the grape mildew, but in these lower productions, wherever a complete cell is produced perfectly individualised, there seems a power of reproduction, and we know not how far the notion of Turpin may be verified, that it may some day be possible to raise a Phænogam from a single cell. Whether this may be true or not practically, some cases of grafting, as the well-known one of the so-called Scarlet Laburnum, tend to show that it is so theoretically. It will not be superfluous to notice further, that in the hop mildew Mr. Broome has found on the same mycelium as the Erysiphe, but on the upper surface of the leaves only, a little brown Sphæria (Fig. 8), intermediate in size between the sporangia and pycnidia. The perithecia contained perfect uniseptate sporidia $\cdot 0005$ inch in length, whereas the sporidia of the accompanying Erysiphe were about $\cdot 0013$. It is singular that a parasite so closely resembling the Erysiphe in form and colour, not to mention other points, should exist in such a situation.

Are we then, after the facts detailed above and elsewhere, to conclude that these Oidia are really states of so many species of Erysiphe? This question seems to me to admit only of one answer, and that affirmative; for though it may be very true that one cannot see the sporangia utricles and pycnidia upon one and

the same thread, and it is impossible to prove the case by reproduction from the spores as in that of dicëious plants, the body of evidence seems so strong and closely connected as to be irresistible. It is true that the real sporangia of the vine mildew have not yet been observed, but considering the identity of their pycnidia with those of known species of *Erysiphe*, it seems very difficult to suppose that they are essentially different. The mildew of the peach may be observed for years without finding sporangia, except at a very late period on the branches; and that of the rose, and of *Lycium barbarum*, as noticed by Tulasne, frequently do not proceed beyond the mucoroid condition. We do not doubt, therefore, that at some future period the true sporangia may be found, and we trust that the little parasite which has been of such unlooked-for importance may still preserve the specific name originally assigned to it, in honour of the very meritorious cultivator who first observed it, and did not cease to study its habits till he had discovered the proper remedy. It may still therefore be named *Erysiphe Tuckeri*, if the name of *Oidium Tuckeri* must perish.

It is a curious fact that in abundant specimens received from the Upper and Lower Corgo and Douro, through the kindness of Messrs. Martiniez and Gassiot, and in specimens of diseased grapes from Madeira, forwarded in 1852 to Sir W. J. Hooker, by C. H. C. Plowden, Esq., (see *Gardeners' Chronicle*, 1853, p. 547; and 1852, p. 579), not a single pycnidium appeared amongst the mould, but in their stead very curious bodies consisting of a large nearly globose terminal cell, with one or two hyaline cells at the base forming a sort of peduncle. These resemble very closely *Conisporium Helminthosporii*, Corda and I have therefore given them the name of *Conisporium commilitans** (Fig. 9), though I cannot conceal from myself the possibility of their being some other form of fruit, however improbable this may seem. At any rate the matter is well worth attention, and I am content to run the risk of the *tu quoque* reproach of adding a name which may hereafter be found useless, as the very circumstance of

* *Conisporium commilitans*, Berk. & Br. Sporis magnis obovatis pallidis granulatis, basi uniseptatis, articulo inferiore hyalino, cum pedunculo brevissimo, cylindrico subconfluente.

Sporæ cervinæ .0014 ad .0015 unc. long. .0011 lat. I am the rather inclined to suppose the *Conisporium* autonomous, as both the Madeira and Portuguese specimens were overrun with *Trichothecium* and other parasites. The more nearly allied species of *Conisporium* are truly parasitic, which is an additional argument in favour of the view I have taken.

assigning a name to any natural production draws more attention to it.

The constant connection of *Antennaria* and *Capnodium*, a genus illustrated on a former occasion at considerable length in this journal, seems exactly analogous with that of *Oidium* and *Erysiphe*. It appears however that though the transformed joints of the *Antennaria* never produce asci, the perithecia of *Capnodium* are very uncertain as to the nature of their contents. Sometimes they are decidedly ascigerous and sometimes as certainly sporiferous. Something however more definite may be discovered now that attention has been drawn to such points, and I should be the very last to lose sight of the fact that to M. Tulasne and his brother is due the credit of opening this new field to mycologists and lichenologists.

Explanation of the Figures.

- Fig. 1. *Erysiphe communis* from Hop leaves, showing the origin of the sporangia from the decumbent threads of the mycelium. From a sketch by Dr. Plomley.
- Fig. 2. Pycnidia produced on the moniliform threads of the *Oidium* of the Hop leaf. Dr. Plomley.
- Fig. 3. a. Pycnidia and inclosed spores from the *Erysiphe* of *Convolvulus arvensis*.
b. Pycnidia from that of *Trifolium pratense*. Both from sketches by Mr. Broome.
- Fig. 4. *Ampelomyces quisqualis*, *Cesati*, sketched by Mr. Broome.
- Fig. 5. Germination of contents of utricles in the Vine mildew.
a. One of the utricles ruptured.
b. Granules beginning to germinate.
c. Various stages of germination more highly magnified. The joints marked 1,1, are the two cells into which the granule was originally divided.
- d. Granules germinating within the utricle.
- d1. Granules from Hop mildew. A similar series of sketches was prepared by Dr. Plomley from the germination of the contents of the utricles of the Hop mildew, but they have been omitted with one exception, as altogether similar to those of the Vine mildew.
- Fig. 6. Erect threads and swollen articulations, the precursors of utricles and sporangia or pycnidia, by Dr. Plomley.
- Fig. 7. Thread which has arisen from germinating granules producing little bud-like articulations. Dr. Plomley. 1, 1, original spore.
- Fig. 8. *Sphaeria Erysiphina*, *Berk. & Br.*
a. Perithecium.
b. Ascus.
c. Sporidia.
- Fig. 9. *Conisporium commilitans*, *Berk. & Br.*

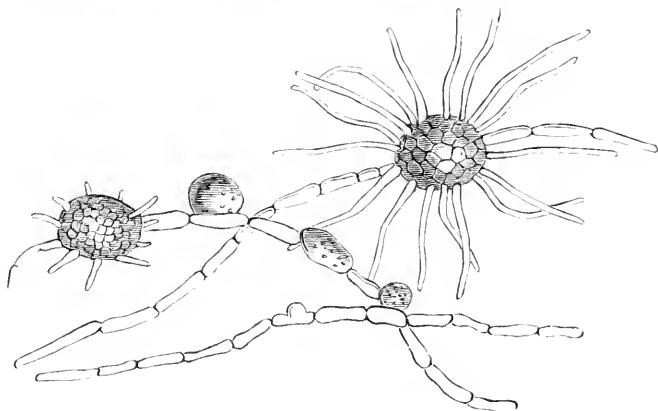


Fig. 1.

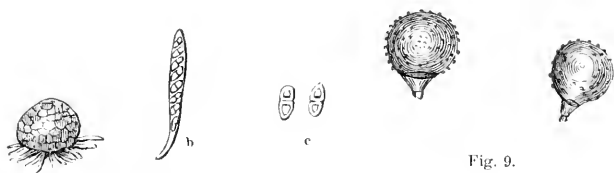


Fig. 8.

Fig. 9.

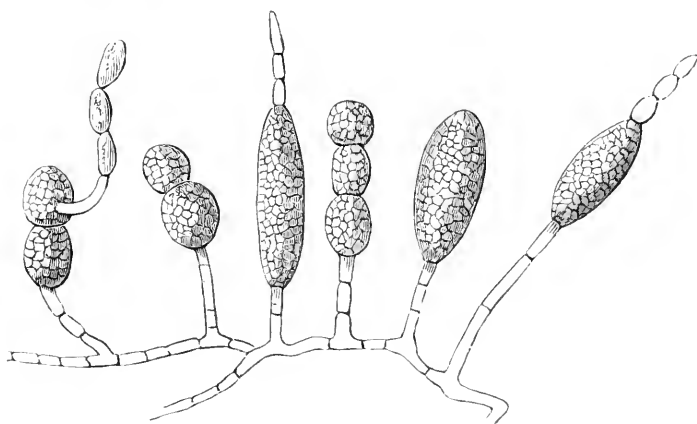


Fig. 2.

Highly magnified figures of

Fig. 6

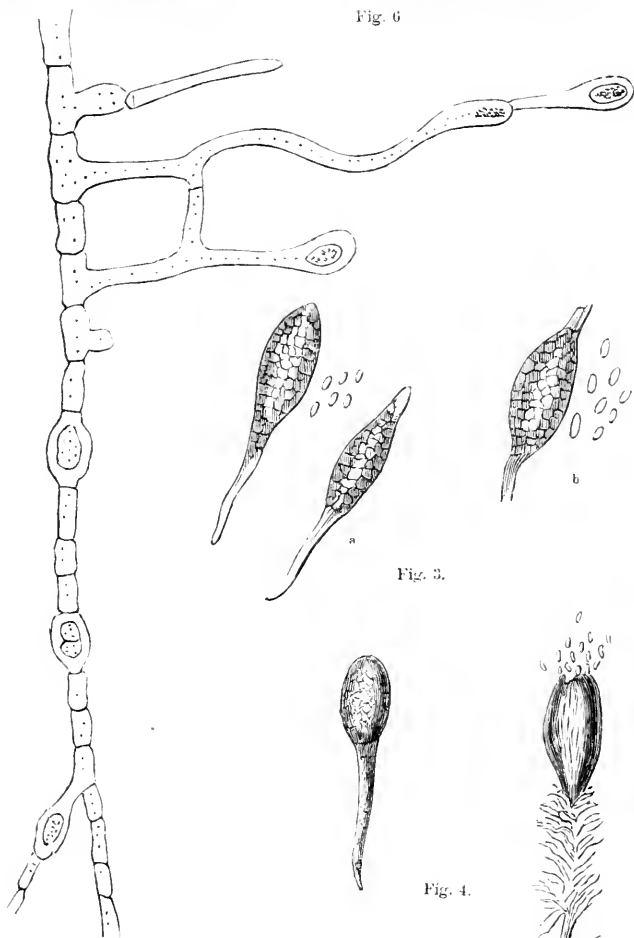


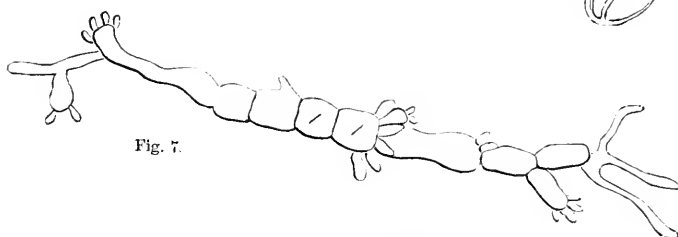
Fig. 3.



Fig. 4.



Fig. 7.



the Vine and Hop Mildew.

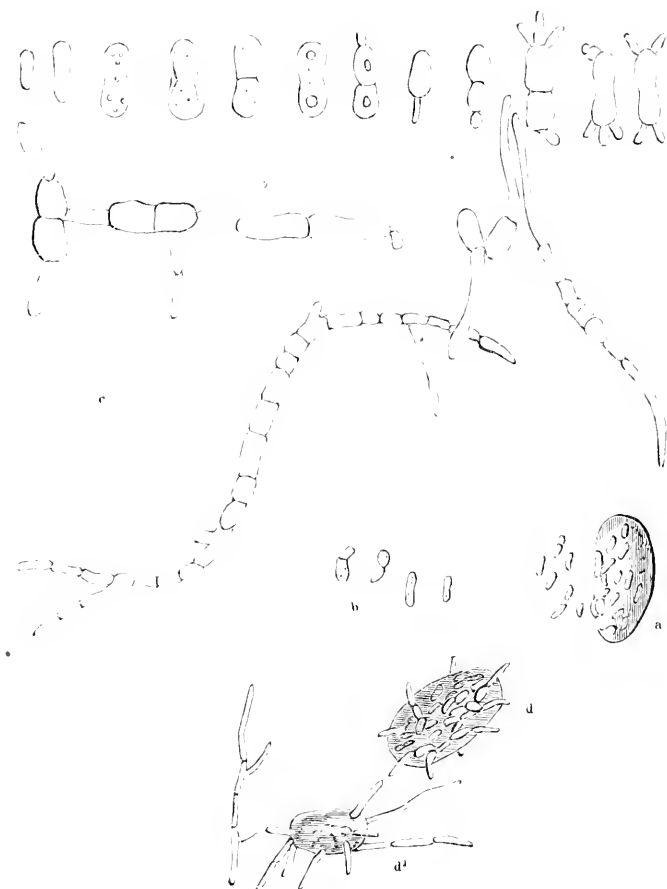


Fig. 5.

Germination of Vine Mildew

VI.—REMARKS ON THE SCIENTIFIC OBJECTS AND USES OF PLANT-HOUSES. In a series of letters to Professor Fürnrohr, editor of the *Flora*, and inserted in the Volume for 1853. By Professor Von Martius, Director of the Royal Botanic Garden at Munich.

(Translated and abridged from the German by Dr. Wallich, F.R.S.,
Foreign Member of the Horticultural Society.)

THE author commences thus:—

I will preface my subject by some remarks on botanic gardens generally. No establishment of this kind can possibly comprise all that is cultivated in similar gardens collectively; nor would it be desirable, because the area, buildings, &c., would be too extensive for convenience or successful study. What is required is, that the number of plants necessary for purposes of public instruction should always be at hand; while the actual amount of species must necessarily vary, and be successive. Widely different is the case as regards public herbariums, which should contain the greatest possible number of species of dried specimens that can be obtained. But a variety of circumstances is constantly affecting botanic gardens, such as the general state of botanical science, the fluctuating taste of the public in favour of this or the other sort of cultivation, the routes of voyages of discovery, and so forth. Some thirty years ago, Pelargoniums and other Cape of Good Hope productions, which are at present rarely seen, were the leading favourites. Mexican, Siberian, Brazilian, and Chilian forms existed in abundance, but are now superseded by others from New Holland, Texas, California, Venezuela, &c. Nay, there are species which make their appearance only ephemerally, and then disappear again from all gardens. All this should be attended to in the construction of plant-houses, as pointing out how important it is to be prepared for a frequent change of cultivation. A judicious selection must be made among a vast variety of plants; and I believe I am right in asserting that the science and acquirements of the director may be tested by the choice he makes; that we may judge of him by what is cultivated in a botanic garden, and of the gardener under him by the manner of cultivation. What, then, ought constantly to be found in a plant-house? Four things are to be kept in view:—1, peculiarity of growth and appearance, or habit; 2, remarkable structures of flower and fruit, and other objects of morphology;

3, peculiarities in the vital functions; and 4, prominent medicinal or other properties. Respect must necessarily be had to the space which we have at command; and here we are obviously bound to prefer, in our choice of inmates, such as are most likely to attain all the stages of their vegetation, or at least those stages which peculiarly recommend them for a place in the house; and, secondly, they must be placed in a situation most favourable for their easy and frequent blossoming. This is scarcely attainable as regards herbaceous plants and shrubs; but the case is very different in regard to trees. Artificial means will help us in many cases; but in others all our endeavours are vain, years and years passing by without the trees showing any disposition to repay our cost and trouble by flowering. In many such cases the judicious director of the institution would, as a matter of course, exclude such refractory inmates, as useless dead weight, were it not that the public expect to have the opportunity of seeing those plants, in any stage, concerning which they have heard or read interesting accounts; such as the Teak (*Tectona grandis*), the Bread-fruit (*Artocarpus incisa*), the China bark (*Cinchona*), Maranham-nut (*Bertholletia excelsa*), &c., however crippled and incapacitated from exhibiting their colossal native growth.

On the other hand, there are numerous plants which, though never or only rarely showing blossoms in a hothouse, are yet deserving a place there, on account of their elegance or some striking peculiarity or other; especially does this apply to arborescent monocotyledons, such as certain lilies, palms, Pandanæ, Smilacæ, grasses, climbing large-leaved Aroidæ, tree ferns, and other remarkable productions; also Coniferæ, such as Cunninghamia, Araucaria, Phyllocladus, Podocarpus; Myrtacæ, Laurinæ, Proteacæ, &c., from Australia and the Cape of Good Hope. If we cannot hope to see flowers we may at least enjoy the sight of some peculiarly splendid production of foliage, although nothing like what is witnessed in tropical countries is usually now produced in our houses; especially is this the case with Aroidæ, (*Anthurium*, *Philodendron*, *Carludovicæ*, and *Cyclanthi*.) producing leaves 8 to 12 feet long. I remember only once having seen these sorts of plants in perfection, at Schönbrunn, under the treatment of the experienced Mr. Schott. Showy plants of the above class require those lofty and roomy houses which are called *serres d'exhibition* in France and Belgium, in contradistinction to the *serres de culture*. All the plants in the former, with the

exception of the Nopaleæ, are forest plants; in the latter they are the humbler vegetation, partly of forests, but chiefly the ground-vegetation of open places.

In the second letter the writer enters into details concerning forest and open (Flur) vegetation. In tropical countries the trees are mostly of the former class, and rarely extend beyond their dense forests, which are constantly tending to expand their limits. Only few trees are so fond of light and impatient of shade as never to be found in forests; as the Cashew-nut (*Anacardium occidentale*). The colossal constituents of forests, its oldest and longest enduring members, reach a height of 80—100 feet and upwards, and cause not only the most striking diminution of light, but also of temperature, which is higher than we usually find in our large plant-houses, namely, 22°, 28°, 30° R. and more. But of these trees only few ever find their way into our houses, and when there, they are almost without exception the most thankless of all, inasmuch as they never produce flowers or fruit there. Who has ever seen a *Tectona*, *Bertholletia*, *Lecythis*, *Caryocar*, or any of the immense *Vochysiæ*, *Qualeæ*, *Laurinæ* or *Leguminosæ*, which form the *haute-volée* of such forests, in those states in our botanic institutions? Though we find these often in the catalogues of the richest gardens, especially of France and England; but they perish prematurely, or else they grow extremely slowly. Below the dense summit of the loftiest trees which form the dome of the forests, three other gradations may be observed, namely, the dicotyledonous trees, and climbers next in elevation, with several palms, which attain a height of 50 to 80 feet; some of them, especially climbing plants, sometimes surmounting the dome itself. Of all these we possess many in our houses, but they blossom rarely. The second gradation is formed by low trees and shrubs, which we call underwood in our forests, such as numerous *Leguminosæ*, *Rubiaceæ*, *Euphorbiaceæ*, *Myrtaceæ*, *Melastomaceæ*, *Piperaceæ*, &c. These are still more in the shade than the preceding series, receiving light only laterally, when the sun is near the horizon, or accidentally from other causes. The last and lowest gradation consists of herbs, bulbs, grasses, *Cyperaceæ*, ferns, &c. *Orchideæ*, *Bromeliaceæ*, *Aroidæ*, and other epiphytes, constitute here an essential feature. But whenever these primeval forests attain their fullest perfection, they consist in colossal trunks only, which have little or no underwood beneath the dense shade, the surface of the earth being at length deprived even of its grassy sod, and even

the epiphytes ceasing to exist. The individuals of this colossal growth must ever be excluded from our plant-houses, however lofty. Other forests, less vast in their dimensions, especially their height, prevail in tropical countries; and they supply our large houses, and even the smaller, with inmates. In these forests there are not the gradations mentioned above; shrubs, and even herbaceous plants, mix with the constituent trees, and the ground is densely covered with grass. The moisture in these forests varies much, according to their localities; and therefore the periods of vegetation vary with them. Trees, both solitary, and whole forests of them, which were naked in the plateau of the Minas during the dry months, I found in leaf, and even in flower, near perennial springs or near rivers.

The author applies the foregoing remarks to show how important it is to separate plants so different in their growth and seasons in our various glass-houses, and how little attention is generally paid to this subject. Subtropical trees and others, produced still further south and north of the tropics, are less difficultly treated because the less vertical light which they are accustomed to approaches more to that in our latitudes in its intensity and effect.

Another grand division is the ground-vegetation, consisting both within the tropics and beyond these of grasses, Cyperacæ, Restiacæ, and a vast number of herbaceous plants, also of those low plants, which form hedges, thickets, and the like. Of such consists that class of vegetation in the prairies of North America, the llanos of Venezuela and Caracas, the campos of Brazil, the pampas of Buenos Eyres, Cordova, Tucuman, and Salta, and the jungles of the East Indies; the Karroo plains of the Cape of Good Hope, the steppes of Persia, southern Russia, and many eastern countries; finally New Holland, New Zealand, and Van Diemen's Land. The number of their genera is immense; the collection of their seeds, tubers, bulbs, &c., far easier than is the case as regards the fruits and seeds of the forest vegetation; their introduction into our houses consequently disproportionately greater. This is apparent, particularly, in English and Belgian garden publications; and the case would be still more striking, if the predilection for Orchideæ, Bromeliacæ, and Scitamineæ had not so extensively predominated for these ten or fifteen years.*

* Note by Dr. Wallich. I wish that the predilection which the author claims for the Scitamineous culture were quite correct! When I left England, upwards of twenty years ago, there was indeed some fondness

Now these *plantæ apricæ* require strong light; for between the tropics they enjoy it from morning until night, with a most vertical sun; in a weaker degree beyond the tropics. All night the firmament is clear, and the radiation of heat very powerful, especially at places which are void of vegetation. The crowded plants throw a narrow and flickering shadow on each other, and exercise a mutual influence by developing warmth and reflecting light, and thus verify the old saying: *Lator una alterius crescit sub umbrâ*. Hence it is that our cultivation is successfully carried on in low houses with oblique windows, on one side, or having them on a pent-roof, in which the heat may be conveniently regulated and proportioned to the means of introducing light. And hence also the facilities which these structures afford to the observant and experimenting botanist. These buildings recommend themselves besides by their cheapness. On occasions when existing high glass-houses are to be rebuilt, the principle on which to proceed ought to be, to remove low or ground-vegetation altogether. There are besides tropical forest plants of low stature, which, truly speaking, do not belong to the class of ground-plants, and which are cultivated not merely for the sake of their general appearance or habit, but for the sake of their producing flowers and fruit: all such should be removed from the *serres d'exhibition*, or palm-houses, into the low or forcing-houses. They require that the light and heat should be nicely proportioned, especially during particular periods, and verify the rule: *The greater the heat the stronger the light*; which ought by no means to be interpreted, the more light the better. I think I have seen glass-houses into which too great light was admitted during certain periods of rest, such as the state of leaf or flower budding, and which caused a yellowish, attenuated, and somewhat arid appearance among the plants. On the other hand, during the highest leaf-development (e. g. of bulbous plants, *Amaryllideæ*), it is impossible to give too much light with the requisite heat.

Light and heat are the two powers by which vegetable life is chiefly regulated and modified. Each spring the entire distribution of plants over the surface of the globe points at this great

for these plants, but it never became general, and it soon after declined; which is the more to be regretted, because their treatment and multiplication are so easy. Never shall I forget the display of *Hedychium* which the Liverpool Botanical Garden exhibited under the hands of its excellent gardener, Mr. J. Shepherd, in the days of the illustrious Roscoe. Nothing that I have ever seen could exceed the fragrance and magnificence of the collection at the time in full blossom.

fact. They go hand in hand in their influences on bodies; the more light these receive and retain, the greater is the heat produced within them; and as soon as they exceed in degree that of surrounding bodies, heat, not light, is radiated from them. The relation in which plants stand, as regards those powers, corresponds in some respects with that which exists in lifeless bodies; and in others it differs, and even in their different stages, as is instanced in a naked tree, which reacts on light differently from what is the case with a tree in full leaf. Some of these influences are well known to us; such as the property of heat to call forth the growth of plants, and of light to produce their green colour, and, by decomposition, to cause warmth. But very many others, it must be confessed, are entirely hidden from us. Thus we believe that light and heat depend, like sound, on the oscillations of an elastic medium; but we know by experiment that there exists a great difference among the rays of light, inasmuch as the perception of light and heat for which our bodies are organised is not the effect of one and the same ray of light, but that the illuminating, heating, and the chemically acting rays may be distinguished from each other, and that their refrangibility and intensity are different. We know that plants receive heat, and that it pervades them and mightily influences their processes of life; but the manner in which it receives modifications from the internal and external form of plants, from the content of their tissue, and even their social life, so to say, is still in many respects problematic, and as far as regards most garden establishments it reduces itself practically to the before-mentioned rule: the more light the better. Yet, nothing is more certain than this, that they produce respectively vast variety of separate effects. Since the time of Senebier it has been admitted that, next to its influence on the process of suction by the roots, light augments and accelerates the perspiration of plants, and causes their green colour, besides affecting divers physical, physiological, and chemical functions. But we are unable to apportion with certainty the different operations to the different rays. M. Dumas's observation, that green leaves produce a weaker photographic reaction than other light-reflecting bodies, makes it probable that the chemical rays operate principally the wonderful formation of chlorophyll, and we discern the green of the leaves because they reflect the yellow and blue (i. e. green), while the other elements of the solar rays become absorbed. We must not suppose, however, that the phenomena are to be accorded exclusively to this or

that influence of heat or light, as may be proved by hundreds of instances. Thus the leaf-bud turns visibly away from the light at the moment of bursting; the young leaves are not always developed towards the south, but follow the general course of warmth in the atmosphere, expanding themselves most actively between south and west, in order to turn green. Nor are plants insensible to the radiation of heat emanating from neighbouring plants, which in some degree affect their development. The degree of warmth which plants receive from the solar light differs according to their solidity and thickness, and should become perceptible towards evening and during night. The radiation of heat from powerful Cactuses and the like plants deserves to be especially attended to.

All these combined influences become greater and more complicated if we reflect, that the vegetable structure consists of a threefold system of growth: the ascending and the descending, which are perpetually in a state of antagonism; that while the atmosphere with its light and heat constitute only one-half of the agencies which affect these green, deaf and dumb, but still excitable beings, the earth—that dark source of warmth—and its moisture, call forth other processes in them. Not to insist on these, physical and chemical powers operate differently according to the degrees of longitude and latitude, elevation of the sea, exposure, season, time of day, character of the soil, &c.; and all the phases in the life of a given plant occur within certain periods in succession, according to its native place. All which tends to prove that the vegetable world must possess the power of adaptation to a considerable degree, in order to accommodate itself to and thrive under the deficient appliances which the art of gardening can substitute for the realities of nature.

In a state of nature, as well as in a hot-house, plants derive warmth from two distinct sources—from the sun as the illuminating, and from the earth and whatever else can radiate heat, as the dark, source. We are unable to give plants from hot countries the same advantages which they derive from those sources in their native places, because the heat of our less vertical sun is not so powerful as in those regions; and the plants consequently receive a smaller amount of stimulus from light and heat from above. We err if we imagine that the heat from a stove or from heated tubes has the same effect, physiologically, as the former combined. We might approach a state of

nature, if it were possible to force a proper degree of heat upon plants by means of red-hot ovens placed at safe distances, or increase the quantum of light by means of multiplied mirrors; but such schemes can only be imaginary. Solar heat will for ever remain a desideratum in the cultivation of tropical or untropical plants, which can only partially be realised, and we can only approach the natural state of things by means of bottom heat, producing a proper radiation, and aided by moisture of a suitable temperature. If I err not, proper attention has not always been paid in the construction of glass-houses to these several sources of heat, the influence of the rays of light and of warmth have been confounded together, especially as regards our chief artificial medium, namely, ground heat. Our ancestors used to derive great results from low forcing-beds; I may notice, among others, the rare exotics of Trew, which were reared in the low manure and bark-beds of his little plant-house, and brought to blossom and fruit in these. I saw the remnants of this pariarchal simplicity some forty years ago at Nuremberg. So also in regard to Jacquin, whose costly works bear witness to great results obtained from comparatively humble means.

It is known that the mean temperature of wells between the tropics continues high all the year round. In the Villa da Barra do Rio Negro in the Amazon territory, I observed the temperature of a well in the sandstone of a forest through twelve days, at seven o'clock, and found its temperature to be 19° R., and the prevailing ground temperature I should in no case rate at a less degree. The Amazon water showed commonly 21° R., and so do its grand tributaries near their sources. But the stream constantly exposed to the rays of the sun, exhibited very often the prodigious height of 37° to 40° R. It may be easily concluded that the lands in those latitudes even of primeval forests must have a constant high temperature. In some regions not overgrown with forest, situated even beyond the tropics, the temperature was still higher, though not with the same constancy. Thus, Sir J. Herschell has communicated to Dr. Lindley most important observations made by him at the Cape of Good Hope.* “On the 5th of December, 1837, Sir John found that the temperature of the earth in a bulb-garden was 159° F. between 1 and 2 in the afternoon (= 56° 44 R.); at three o'clock 150° F. (= 52° 44 R.); and even in shady situations 119° F. (= 38° 67 R.); while the

* Lindley's Theory of Horticulture, p. 99.

temperature of the air in the shade was at the same times 98° F. ($= 29^{\circ} 33$ R.) and 92° F. ($= 26^{\circ} 27$ R.). At five p. m., and four inches below the surface, the ground which had been much shaded, had still a temperature of 102° F. He points out that these observations prove that in the hot months at the Cape, roots and bulbs, which do not derive their support from any great depth, endure commonly a temperature which could only be imitated in our hot-houses by holding red-hot iron plates over the earth; for it is to be remembered that bottom heat imparted from below would by no means distribute such a degree of temperature." So far the experienced Lindley.

I need not observe that the bottom-heat of our glass-houses, that is where bark-beds are not used, is not very high; so that if a person were to sleep during a night on the floor, he would not escape unhurt, as travellers do in hot zones. In places where the ground is heated by subterraneous fires and solfatores tropical and subtropical plants often thrive well; they are thrown back at the beginning of the cold season, but in the warm nest below the surface that part is sufficiently supported to shoot forth again in spring. These are facts which ought to guide us; and as a proof of this I may instance the splendid effect of the ground heat in the grand palm-house at St. Petersburg.

The consequence of a diminished degree of heat in the root and stem system of tropical forest trees is condensation of the wood and tardiness in flowering resulting therefrom; for although the monocotyledons among them are unremittingly forming fresh inflorescences, yet these remain for the most part concealed and in an undisclosed state within the base of the leaves to be brought forth only during an especially favourable summer. The *Agave Americana* blossoms proverbially only once in a hundred years; although in the southern parts of Europe this period is much shortened, and within the tropics still more. All this demonstrates that a certain and successive degree of heat produces regularity in the flowering periods, especially among monocotyledons; and therefore it is that the experienced cultivator, in order to attain this object, transports the hardy blossoms from a high to a low glass-house. But dicotyledonous trees which have been long kept under a low temperature have their wood often so much condensed that neither the pruning-knife nor anything else will make them produce even a rudimentary inflorescence.

In general, we can more readily command the temperature of the air than the ground in our plant-houses; but still we fall short

in regard to the measure, succession, and duration of heat in the tropics. During our winter we might approach the actual temperature of the cold months in those countries : but we must not attempt it ; on the contrary, we should endeavour to bring about a compromise between our summer and winter, so as to bring the annual mean temperature below that of tropical countries. The temperature in our large plant-houses ranges probably to the height of 25° C., or 20° R. In hot summers, provided there is due moisture and atmospheric currents within, the sun will raise that heat to 24° — 30° R. It is obvious that we cannot raise the heat from so dark a source as a stove to equal that emanating from the sun without danger to the plants, because light must be proportionally increased, as must also the hygroscopical condition of the air, since by far the greater number of plants experience in their native countries the greatest heat in the wettest season, that is, in that of the rains. We allow the temperature during winter to come down to 12° R. at night, and to 13° and 14° during the day, which the plants very rarely experience in the tropics. Mr. Schott, one of our most successful cultivators, and who has had local experience, considers 16° to 18° R. the most appropriate temperature during day time, lowering at night from 14° to 15° R. I agree with him that at Munich a high plant-house will bear 18° R., provided the glass covering is double and the heating apparatus effective enough. I need not observe here that this degree of heat, which is two or three or even more degrees higher than the usual amount, should be uniform throughout the building, and that there should be a constant current in the air, so that its different layers may become duly mixed ; otherwise the upper parts of the house would be suffocatingly hot and sultry ; I know indeed of a celebrated instance where the plants above require to be frequently shifted or exchanged. Glass covering to the north contributes essentially towards causing such an invisible interchange of the differently heated layers of air, and serves therefore not alone for the admission of light. The ordinary means of ventilation will not produce this salutary effect, however beneficial it may be to Cape or New Holland plants. An hygroscopical increase by means of vapour is here of great importance. A proper system of shading is likewise indispensable for the due regulation of those two powerful agencies—light and heat. Nevertheless the crowded plants will not always thrive equally well under the most favourable circumstances ; while some will grow and expand luxuriantly, others will

suffer from excess in this respect, and the hope of their flowering will be frustrated; indeed, it may be taken as a rule, that the processes of vegetation and fructification are not the result of a uniform continuance of these conditions. Plants frequently require strong heat and moisture for their free growth and preparation for blossoming, while to ensure this latter stage they must have more light and a drier heat. A sudden change from a favourable combination of circumstances to one less so, will also produce this effect. Considering the multifarious exigencies of each particular sort of plant, how difficult, rather how impossible, to meet them in detail! All we can do is to individualise our cultures by means of numerous plant-houses, each adapted for a limited assemblage of those plants, which correspond most in their various conditions of life.

The modern labours of Dove, Quetelet, Kreil* and others, on the dispersion and motion of caloric, exhibiting a mighty system of causes and effects which influence all living creatures, cannot fail to be productive of the greatest practical results in agriculture and gardening. The time may come, perhaps, when the difference of zones will to a certain extent be overcome in our gardens. But, as yet, our cultures are subject to severe difficulties, not the least of these being the complete reversion of seasons in our hemisphere, as compared with the other, and the difference in the periods of development, depending thereon; not to mention the countless local differences which influence the vegetation of the same hemisphere and the same latitude. Hence it would be of the greatest use if an attempt were made to furnish the art of horticulture with an appropriate geography of plants, combining besides a general account of the distribution of heat and the climate, also a minute detail of the local peculiarities of those parts of the world which possess a peculiar Flora. It is my humble opinion that considerations of this sort have not been sufficiently attended to in practical horticulture, in as much as we collect together plants from the most different parts of the world and crowd them together indiscriminately, within one and the same building.

The following two tables, which I have extracted from Dove's work, will serve to convey to the eye what I have briefly sketched out above.

* Dove, *Connexion of the Changes of Atmospherical Heat with the Development of Plants*, Berlin, 1846, 4to.; *Movement of Heat in Strata of Different Geognostic Characters*, 1848; *Tables of Temperature, with Remarks*

MEAN TEMPERATURE OF THE MONTHS.

Place.	Latitude	Longitude E. & W. of Greenwich.	Height	Jan.	Febr.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Munich . . .	48. 9	11.36	1573	1.07	0.45	4.08	6.63	11.38	13.38	14.55	14.26	11.63	7.65	3.12	1.29
Lisbon . . .	38.42	9. 9	—	9.12	9.60	10.80	12.00	14.08	16.64	17.84	17.44	16.64	13.60	10.40	8.64
Cairo . . .	30. 2	31.15	—	11.60	10.72	14.48	20.40	20.56	22.96	23.92	23.92	20.96	17.92	13.76	13.04
New Orleans . .	29.58	90. 7	—	11.00	11.73	15.37	17.96	20.12	22.12	22.32	22.28	21.08	16.76	11.87	9.00
Ava . . .	21.50	96. 5	—	14.52	18.43	19.37	24.08	23.10	23.77	22.57	22.43	22.52	21.59	18.75	16.13
Madras . . .	13. 4	80.19	—	20.53	21.31	22.92	24.27	25.62	25.35	24.31	23.73	23.70	22.92	21.32	20.67
Colombo . . .	6. .	80. 0	—	20.98	21.51	22.39	23.26	23.02	22.09	21.47	21.60	21.44	21.07	20.78	20.38
Havanah . . .	23. 9	82.13	—	17.50	18.68	18.70	19.83	20.43	21.78	21.98	22.03	21.50	20.82	19.17	18.46
Paramaribo . .	5.45	55.13	—	20.55	20.45	20.86	20.96	21.28	21.12	21.34	22.22	22.86	22.79	21.98	21.18
Batavia . . .	— 6. 9	106.53	—	20.44	20.88	21.10	20.88	21.33	20.22	20.44	20.88	20.88	20.00	19.11	20.88
Lima . . .	—12. 3	77. 8	530	20.48	21.28	21.36	20.16	20.40	16.16	16.24	15.68	15.20	16.56	17.76	19.04
Rio de Janeiro . .	—22.54	43.16	—	21.39	21.35	20.42	19.32	17.19	16.30	15.62	16.87	17.10	18.14	18.84	20.12
Cape Town . . .	—33.56	18.28	—	18.83	19.54	18.11	15.60	13.39	11.50	11.37	12.70	13.29	14.64	16.95	17.94
Montevideo . .	—34.54	56.13	—	21.34	20.00	18.66	17.78	11.55	10.66	11.12	12.00	11.55	15.11	16.89	19.11
Macquarie Harbour	—42.12	145.28	—	14.32	14.32	10.67	11.36	7.50	4.91	5.98	7.29	11.91	10.89	11.51	14.32

MEAN TEMPERATURE OF THE SEASONS.

Place.	Winter.	Spring.	Summer.	Autumn.	Year.	Difference between hottest and coldest Months.	Difference between Summer and Winter.
Munich . . .	0.22	7.36	14.06	7.47	7.28	15.62	13.84
Lisbon . . .	9.12	12.29	17.31	13.55	13.07	9.20	8.19
Cairo . . .	11.79	18.48	23.60	17.55	17.85	13.20	11.81
New Orleans . .	10.58	17.82	22.24	16.57	16.80	13.32	11.66
Ava . . .	16.36	22.18	22.92	20.95	20.61	9.56	6.56
Madras . . .	20.84	24.27	24.46	22.65	23.07	4.82	3.62
Colombo . . .	20.96	22.89	21.72	21.10	21.67	2.88	0.76
Havanah . . .	18.21	19.65	21.93	20.50	20.07	4.53	3.72
Paramaribo . .	20.73	21.03	21.56	22.54	21.47	2.41	0.83
Batavia . . .	20.73	21.10	20.51	20.00	20.59	2.22	—0.22
Lima . . .	20.27	20.64	16.03	16.51	18.36	6.16	—4.24
Rio de Janeiro .	20.95	18.98	16.26	18.03	18.56	5.77	—4.69
Cape Town . .	18.77	15.70	11.86	14.96	15.32	8.17	—6.91
Montevideo . .	20.15	16.00	11.26	14.52	15.45	10.22	—8.89
Macquarie Harbour	14.32	9.84	6.06	11.44	10.42	9.41	—8.26

These tables exhibit the mean temperature of each month and of each season, in fifteen places, nine of them being north, and six south of the equator, selected on purpose, each belonging to a different floral domain. I have placed Munich at the head, as the point of comparison; and this place, with Lima, are the only ones in the list, which do not lie near the sea, or are little elevated above it. Now, if the mean temperatures are represented by means of lines, curves will be obtained, by which the horticulturist may at a glance learn the changes of heat of each place, and how the two seasons are reversed in the two hemispheres. The heat regulates the vegetation of each place, both north and south of the equator; but as to the hemispheres, what we cultivate at Munich from the southern, must throw off its native course of development and accommodate itself to its altered location. While our mean temperature at

on the *Distribution of Heat over the Earth's Surface, and its Annual Periodical Changes*, 1848; *The Non-periodical Changes in the Distribution of Temperature over the Earth's Surface*, 4 vols., 1840-47; *Distribution of Heat through the Isotherms, Thermic Isanomals, and Temperature Curves*, 1852. Quetelet, *Sur le Climat de la Belgique*; and his numerous papers on periodical phenomena in the vegetable kingdom, in the *Brussels Memoirs*. Kreil, in the *Magnetical and Meteorological Observations made at Prague* (in 1844-45), and in *Proceedings of the Imperial Academy at Vienna*. Not to mention the labours of Melloni, Forbes, Pouillet and others, on other questions connected with heat.

Munich, in June and July, is $13^{\circ} 38$ R., and $14^{\circ} 55$ R. respectively, it is at Port Macquarie $4^{\circ} 91$ and $5^{\circ} 98$; and while our December and January indicate $1^{\circ} 29$ and $1^{\circ} 07$; they are at that place $14^{\circ} 32$. The practical gardener may derive many valuable hints from tables of this nature. He will avoid crowding together in one house natives of both hemispheres, for it is obvious, that those from the northern will better endure the diminished winter temperature than those from the southern, which at that very period experience their warmest summer; they will even benefit to a certain extent by such a diminution, provided it does not greatly exceed in degree that of their native place. In all cases where quiescence of vegetation and winter-rest are caused, not by want of moisture, but by a low temperature, we may apply it during winter to plants from the northern hemisphere. But the plants of the other half of the globe require very great nicety of adjustment on account of the reversed seasons to which they are accustomed. Experience teaches us, that plants possess, to a certain degree, the power of accommodating themselves to modifications in the ordinary course of seasons, even in their own countries. The same plant will submit to a shortened period of vegetation, the more it approaches the pole or ascends mountains. In his paper entitled "Observations upon the Temperature to which plants are naturally exposed in New Holland," contained in the journal of the Horticultural Society of London, vol. iii. (for 1848) p. 282, Dr. Lindley furnishes us with most important information upon the subject before us, and which I strongly recommend to careful study.*

I cannot entertain a doubt, but that in the distant future, the cultivation which is now carried on in plant-houses—those substitutes for tropical zones—will acquire a degree of perfection which it is almost impossible to anticipate even in imagination. Not that we can ever expect to see the pine-apple growing in our fields, or our streets and squares lined with bananas, coffee-trees, or palms; but some mighty potentate or wealthy people will improve upon the wonderful Crystal Palace at this moment rising at Sydenham, and bring us in bodily contact with the luxury and magnificence of a tropical world. All sciences will combine to produce such results, and posterity will look back on us with the proud humility of a Watt, or a König—the discoverers of the

* As the above Journal is not generally known in Germany, the author gives here an extract from the memoir.

steam engine and steam printing. As yet our glass-houses are mere make-shifts ;—science alone, in the most extended sense of the word, can perfect them ; and here, too, the English saying, “Knowledge is power,” will have its full application. The researches of Dove convince us, that there exist influences in nature, which those structures either do not admit at all, or only in a very imperfect degree. Granting that we could introduce a due proportion of heat, light, and moisture: still the real solar influence, with all its thermic, chemical, and other powers, the radiation from the soil, and its other properties of conducting heat and moisture, &c., belonging to tropical countries, are impossibilities to us. Our vegetable wards, properly speaking, have neither the proper location nor soil, accorded to them in their own native climate, they are doomed to a sort of anchorite life of solitude, in some tub or cask, instead of the free expanse of land and air, to which they have been habituated ; and how much they suffer in consequence, is proved by the contortions of roots and stems, and the excrescences, &c, to which they become subject. The sun’s light conveyed to them has to pass through panes of glass differing in colour and thickness, placed at various inclinations towards the horizon and ecliptic: all these are deviations from the natural state of things, so great as not to be counterbalanced. A distinguished English natural philosopher, whom I consulted on the best mode of constructing glass-houses, expresses himself in this manner ; “The rays of heat pass through glass, as well as liquid substances, and probably also through vapour in the atmosphere, in a very capricious manner. If it is considered, besides, how small a portion of the entire solar spectrum is luminous, and how extremely variable is the absorbent action of the media, we are led to a belief, that the question of the most appropriate construction for the reception of light still remains unanswered. We can only advance by direct experiments.” The problem receives further complications, according to each locality, from latitude, clime, exposure of the house, &c., and even from the chemical structure of the glass used. Respecting this last article, a talented botanist, who has at the same time a great degree of practical experience in gardening, writes to me as follows : “Part of our house had colourless, the other green glass ; the former we are now obliged to paint white, and the latter has lost its colour, which has happened also at various other places. With all respect for the progress of chemical science, it must be admitted, that the old glass-manufacturers delivered articles of durable colour, while at present this

result can only be secured by means of a binding contract. The green colour of glass becomes a breakfast to the sun, which, when thirsty, drinks up all the green and leaves the glass vacant. I think with Hooker that blueish-green glass is best suited for our purposes." Finally—what suits one place does not suit another; for instance, Paxton's system of numerous ridge and furrow roofs, so highly prized in England, would certainly not answer in our snowy climate.

The nearest approximation to a perfect influence of the sun would be effected, if it were possible in summer, and in favourable weather, to remove the glass covering altogether during the daytime, as is done in conservatories in southern Europe. But as such an arrangement is impracticable, we must endeavour to accommodate ourselves to circumstances as well as we can, and take care to provide the greatest quantity of light; but the intense luminous, heating, and chemical powers of a tropical sun, we must, once for all, give up the hope of imitating in our latitudes. Thus situated, we will try to find out the degree at which plants are really dependent upon light; and as data for this investigation must be derived chiefly from our own Flora, we must apply them on the principle that, since each Floral Domain, in every climate, is subject to the same laws of nature, observations made in Germany may furnish us with certain general rules, applicable to the productions of all other countries.

Let us take the common fir as an example of the influence of light and heat on the growth of forest trees. When raised from seed in an open plain, it will grow regularly in height, and expand its branches in all directions, which will remain a long time in the form altogether of an upright cone. When the lowermost become so long as to touch the ground, they die off, and the next in succession take the place of them: and this process is repeated as the tree advances in age and dimensions, so that, if no disturbing injuries intervene, its coniform appearance remains still the same, at a height of above eighty feet, as it was when it measured only fifteen feet. At a certain age, proportioned probably to the production of its branches, the individual becomes fertile, and seeds are matured, of which, again, according to certain influences, the proportion of barren ones gradually decreases. As the fertile seeds meet in the immediate neighbourhood with favourable conditions for their growth, a little grove springs up round the parent stem, and a struggle of development takes place among the crowded seedlings, in which some succumb, and

thus the commencing forest thins itself, according as the locality is favourable or otherwise. The denser the crowd is, the less are the young trees able to send forth branches, and the more are these shortened and impoverished; while, at the same time, the stems themselves push on rapidly in perpendicular height, in order to lift their crown towards the light. Gradually fertility comes on, the forest extends itself centrifugally in all directions, most of the seedlings under the shade perishing off in their infancy. The open plain is now converted into a green and shady forest; the underwood is gradually suppressed by the powerful growth of the trees, giving way to a vegetation of shade-plants and of mosses. But now the parent tree shares the lot of part of its own progeny; these deprive it of its means of existence, the soil furnishes insufficient food, the air supplies inadequate light, heat, and moisture, and gradually it dies down to the root. Such is the universal course of nature; and, modified according to local diversity, it prevails all over the vegetable world. The sagacious forester knows how to turn this to advantage, by thinning and other processes. He notices that where a vacant space occurs, the nearest trees extend their branches most actively in that direction; and that the trees on the skirts of the forest produce the strongest branches outwardly; in short, that the trees, as well as their boughs, entirely obey the light and its concomitant heat in their development—that this is greatest on the open, least on the shady side. But he perceives at the same time, that reflected heat and its radiation, as well as the quality of the soil and its moisture, essentially qualify these effects; that trees differ much in their predilection as regards light and shade; some demanding the former, some requiring the latter, while others will barely, or not at all, endure shade; finally, that all these combined phenomena vary according to the different periods of life in individuals.

In a narrow valley, extending south and north, all other conditions being equal, the western aspect will be most luxuriant, because the solar influence is greater and lasts longest on that side, producing greater radiation. If vertical rocks are present, especially of white colour, there will be an active reflection of light, illuminating as well as heating. In case the direction of the valley is east and west, the vegetation will be strongest towards the south from a similar cause. A tree on a northern declivity of a hill will send forth more slender branches to the north, and stouter and more leafy to the south, and *vice versâ*.

There are deviations which will have to be ascribed to the prevalent direction of winds, or thunder storms, the peculiarities of seasons, sources of irrigation, the physical and chemical qualities of the soil, &c. But there will still remain phenomena which admit of no satisfactory solution; as, for instance, the torsion of trunks, especially of Conifers, producing a corresponding structure in the wood, the fibres turning with (that is, from right to left), or contrary to (from left to right), the course of the sun (*nachsonniges und widersonniges Holz*), and which varieties are practically attended to in the highlands of Bavaria.

I feel convinced, that our plant-houses ought to be constructed in accordance with the preceding considerations, the chief results of which are—1, that each tree possesses, originally, the conditions of uniform and symmetrical development; 2, that a variety of external influences interferes with that development; and 3, these influences, though they may degenerate into cases of sickness, are by no means to be looked upon as unnatural, but belong to the ordinary system of nature in the vegetable creation, constituting what the ingenious Kielmeyer calls *Politia vegetabilium*. Hence this twofold corollary: the number of plants in a house must be judiciously limited, and partial developments will sometimes occur among the plants contained in it, since nature allows such to exist in the wild state. In England, where numerous establishments of this sort exist, and on a large scale, such overcrowdings are rarely seen; and besides, cultivators frequently limit their efforts to particular objects. Not so in Germany, where the contrary tendency prevails, and a stranger consequently forms an unfavourable opinion of our so-called riches, especially in public gardens. Again, inexperienced, only half-informed people, are apt to blame the cultivator, when he sees that plants in a hot-house strive to elongate themselves towards the light, although he would hardly notice the much more frequent and still stronger tendency of that description in open nature. Excess may of course be the result of a faulty construction of the building, and become offensive to the eye; but my experience has taught me, that so far from the turning of a woody plant towards the light being injurious to their production of flowers, it has occurred most frequently in years which were the most prolific in flowers. I conclude that both these events resulted from one source, namely, a favourable combination of circumstances, causing a higher degree of vegetable activity.

The most impenetrable of all wonders are the three-twins : light, heat, and shadow. They appear ever combined together, and as regards the two first, they grow into each other in such a wise, that no mortal has ever pointed out their line of demarcation ; while the third brother, shadow, is an unsubstantial negative, likewise intimately united with the two others. Unseen it traverses the eye of the smallest needle, and the widest church gate ; only when its brothers are obstructed in their course does it make itself perceptible. The vegetable world is dependent on light and heat, as well as their negative, shade. Leaving out of consideration the class of countless *Diatomeæ* which have been given to science, if not to the animal kingdom, by the researches of Ehrenberg ; and the fungi of dark and damp recesses, the world of green plants is so powerfully influenced by light and shade, that we must bring certain practical results, connected with them, to bear upon the construction of our glass-houses. Gustav Heyer has recently published a graduated list of timber trees* which endure shade, or require light.

The author points out that the relation of these important timber trees towards light and shade, is indicated by their dense or light foliage (in forests), the extent of time in which oppressed branches and stems will keep alive, and the ability of the young plants to thrive under the old stems. But this dependence on light and shade becomes modified by interfering circumstances. Thus, on rich and fertile, or moist lands, plants which would otherwise require light, will thrive in shade. In the rich loam of the mild Wetterau, potatoes and grain thrive quite freely under the shade of fruit-trees ; while a little further northward, in the less fertile soils of Giessen and Marburg, the area under trees remains naked. Great difference occurs also in hilly situations, where frequent fogs and rain prevail. We must bear in mind, further, that northern declivities of mountains have often a thicker layer of mould than southern ones, in which it becomes more rapidly decomposed and is dispersed, as may be observed in primæval forests of tropical countries. All these matters should assist us in our work, as far as the scanty information we possess concerning the specific relation of tropical plants towards light and shade, &c., will enable us. But, in fact, we are unable satisfactorily to limit the boundaries between the luminous and

* Das Verhalten, &c. ("Relation of Forest-trees to Light and Shade.") Erlangen, 1852. 8vo, p. 3.

chemical effect of light on plants; because we perceive the former of these exclusively by the aid of an organ, which is wholly denied to the vegetable world, and even to the lower orders of animals.

What we call eyes or buds in plants, are undoubtedly more affected by light, as an illuminating power, than any other organs, as far as regards their growth, which I consider, moreover, as a mechanical result. By way of objection to this apparently heterodox view, it will be asked,—Is not light the universal stimulus of plants? Does it not operate on those green, and blind, deaf, and dumb beings in the same way, as it does on those many-coloured ones among lower animals? Is not M. Treviranus correct in assuming, that the influence of light among plants supplies that of a nervous system? Is not the graduated predilection of plants for light and shade a proof that they cannot exist without some degree of light, as such? Is it not the same as regards the indispensable succession of light required by all plants? And, lastly, have not the various movements of plants a direct dependence on light, apart from heat? I answer in the affirmative to all these queries: light, as an illuminating power, is an essential life-stimulus to plants, even though they do not see it; but only in so far as the plant is, and must be, a moving being. Let us, by way of explaining my meaning, take the homely example of a dark cellar, in which is kept a quantity of fresh potatoes with eyes, and unseemly shaped sprouts. If a pencil of light is thrown among them, so as to touch almost the hinder wall against which the potatoes are piled, when the sun reaches a certain point, the shoots will be seen to strain and elongate themselves in a remarkable degree towards the luminous opening, especially those that are opposite to it. What is the influence which the light exercises in this case, where it does not touch the roots, and cannot therefore operate either by its heating or chemical properties? It is growth: a sort of organic reacting movement called forth by the undulating motion of the ether caused by light. Thousands of similar observations serve to point at this innate tendency of plants towards light. But this reaction, though proportionate to the inappreciably minute motion of the ether, so that it will probably never be observed in the single cell, is something mechanical, in as far as it affects a body moving in space. It follows hence:—1, that light, as luminous, belongs not to general stimulants; 2, that it operates not directly, but indirectly through the atmosphere, or water, or ether; and 3, since the calorific and chemical effects of light depend on the

quality of matter, light itself is neither a universal nor a direct stimulant of vegetable life.

Since plants do not see that light which causes their growth ; there must necessarily exist, to them, a sort of dark light ; in other words, the light which we see and feel can only exercise an indirect power on the vegetable creation. Plants have no nervous system, and what I call their soul is nothing but their inherent *nisus formativus*. Hence, they are not susceptible of any real dynamic irritation that is unaccompanied by mechanical or chemical power. Light must consequently operate differently upon them by something different from its luminous quality. A plant which turns towards the light reacts on its dark, not its luminous power. To the question, is light *per se* cold or warm, I reply it is neither ; it possesses no temperature, but it makes it.

Ingenhouss has long ago laid down the maxim, that solar light is hurtful to the commencing germination in proportion as it is beneficial to the growing plant. Meese, A. v. Humboldt, and many others have corroborated it, and so does our daily experience. The bud, however, is accelerated in its development by the influence of light, especially direct from the sun, and this appears in a more marked manner in the covered (*gemmae perulatæ*) than the naked buds. As a general law, subject of course to partial modifications, our most eminent Treviranus has stated, in concise terms, that the ascending axis, the upper surface of the leaf, and the flower, require the stimulus of light ; whereas the descending axis, the under leaf-surface, and the fruit either require it not, or are even injured by it. In conformity with these postulates we must construct our glass-houses, and I believe a strong reflection of light is better than a weak one, and that a bluish durable colour is preferable to others.

According to Aubert du Petit Thouars and his followers, it is the leaves that build the tree ; a truth which might be modified by saying that light, supported partially by heat, builds the tree. We must, accordingly, provide as much, and as diffused light as possible in our houses, in order that the contents may spread their branches symmetrically in all directions. It is a matter of course, that a proportionate degree of heat is likewise indispensable. All this is plain enough, when the question is simply the cultivation of trees and shrubs for the sake of exhibiting their natural habitus to greatest advantage, but since we have to provide also for their periods of flowering and fruiting in perfection, certain points are to be considered. Those periods may be fitly divided into four

stages, namely: 1, the incipient stage; 2, the formation of the inflorescence; 3, the expansion of the flower from its bud, and its anthesis; and, lastly, 4, the production of fruit and seed. On the three first stages light exercises a powerfully promoting influence; on the last, this is the case only in some plants, while the fruits of others are indifferent to light, or even hurt by it. Of the powerfully beneficial influence of heat and light on fruit, the Mango, to me the most delicious of all, affords a striking instance. The tree is densely leafy and shady. Those of its large fruits which are produced on the outside of the crown of the tree, being exposed to the direct solar power, possess a nobler aroma than the others placed in comparative shade, and thus may a great variety of *nuances* be discovered among the produce of one and the same tree, as regards sweetness, acidity, aroma, resin, &c.* The same applies to other fruit-trees.

A botanic garden may be considered as an observatory (*specula botanica*) in which the different plant-houses form the principal parts. We have now to consider what are the plants to be cultivated in these, for the mode of cultivation is only a secondary object of my present enquiry. In the first place the principal types of the vegetable world ought to be found in the houses, and the more judicious and complete the selection is in that respect, the more is the intention of the institution realised. But this is a matter of great difficulty; and hence, the richest gardens, such as those at Paris, Kew, Berlin, and Vienna, are still far from the mark. Some families of plants do not admit of being brought into cultivation, or only to a very limited extent, such as Xyridæ, Eriocaulæ, Burmanniaceæ, Gilliesiaceæ, Taccaceæ, Brunoniaceæ, Chlænaceæ, Dipterocarpeæ, Rhizoboleæ, Vochysiaceæ, Alangiaceæ, Olacinæ, Podostemaceæ, and Lacistemaceæ. It is not simply the actual rarity of certain plants in their native

* My heart warms in this gloom of long continued confinement from indisposition, at the distant recollection called forth by the above just picture of the far-famed fruit, which I and other old Indians might very properly call our Mango food, because, when in season, it is truly the daily food, morning, noon, and evening, of genuine amateurs. Nothing can be more correct, than what the eminent author says concerning the striking influence of strong solar heat and light, on the produce of those trees. While the fruits of some favourite and choice individual, most intensely exposed to those influences, are exquisitely balsamic, sweet and delicious, the rest become gradually less so, participating more or less of the vulgar uneducated Mango, graphically and not inappropriately assimilated in its flavour to a carrot steeped in turpentine. A Crab-mango, if I may use the term, is indeed very *kh'arab* (which means bad or vile in Hindustani).—*Translator.*

places, but also the difficulty to procure perfect seeds, or to preserve growing plants alive which oppose our endeavours. Not to mention such tribes as Loranthaceæ, Cytineæ, Balanophoreæ, Rafflesiaceæ, and the like, who has ever been so fortunate as to study in a glass-house a *Lardizabalea*, *Schizandracea*, *Lacistemea*, or *Gyrocarpea*? It is curious that many kinds of seeds will out-live long voyages, while others similarly constituted soon perish.

But something more than the mere existence of some rare productions is required to compensate for the cost and trouble of obtaining them. The Seedling *Bertholletia*, *Caryocar*, *Lecythis* and the like, which are annually imported from the colonies, perish soon, and without being of the least use, that could not be equally well derived from Herbarium specimens. Such articles may parade in garden catalogues as great rarities, but are in reality very worthless items. The longevity of trees, such as those just mentioned, is generally in a reversed ratio as regards their period of development; but there are exceptions; f. e. the *Bombaceæ*, which will grow with rapidity when transported into our houses. We ought further to consider well, whether certain forms, which may be easily made to flower, are of sufficient importance to take up room that might be more usefully occupied by others. Whether we cultivate 20 or 100 sorts of *Erica* is, scientifically speaking, indifferent; and the same may be said of many Cape and New-Holland *Thymelaceæ*, *Proteaceæ*, *Epacrideæ*, *Leguminosæ*, and *Rutaceæ*. A botanic institution should enable the student to examine the characters of living genera; but of numerous species only in such cases, where the Herbarium renders their study difficult. The sorts of *Gnidia*, *Pimelea*, *Erica*, many *Proteaceæ*, *Rutaceæ*, Grasses, *Cyperaceæ*, &c., may be quite satisfactorily examined in their dried state; but the beautiful and minute systematic characters of Schott's *Aroideæ*, Roscoe's *Scitamineæ* and Nees v. Esenbeck's *Acanthaceæ*, require to be examined in the hot-house; so also with respect to the fertile researches of Gasparini and Miquel on the diversity of the floral structure in the fig tribes.

Owing to some peculiar predilection in favour of certain forms, many of them are admitted in exorbitant numbers; such as Cape and New-Holland, Mexican and South European *Compositæ*, which are represented to a very disproportionate extent in many botanic gardens. Thus the Paris Garden contained in 1850, 350 genera of that family, according to H. Brongniart's catalogue. Peculiar morphological forms give great eclat to the house; f. e. the

ampullæ of *Utricularia*; the ascidia of *Cephalotus*, *Nepenthes*, and *Sarracenia*; the ciliated and irritable leaves of *Dionæa*; the coral-red two-lobed bracts of *Ruyschia* or the many-coloured swollen ones of *Souroubea*; the elegantly coloured leaflet on one of the calycine teeth of *Calycophyllum*; the ornamented glandular usually involute leaves of *Dracophyllum*; the red calyx of *Erythrochiton*; the divers forms of petals in *Erythroxyton* and many *Sapindaceæ*; the white involucre of various forms in the Australian umbelliferous genus *Leucolæna*; the curious spathe in *Pistia* and *Ambrosinia*; the tendril-forms of various *Cucurbitaceæ*; the double floral torsion in *Disa*; the indusiate stigma in *Goodenoviaceæ*; the unusual forms of flower in *Aristolochiæ*, *Passifloreæ*, *Belvisiæ* and *Loasææ*. I need the less to extend this list, which would be easy enough, had not professor Schitzlein promised me that he would publish, for the use of Directors of botanic gardens, an enumeration of such morphological forms. These connect themselves often with facts and considerations appertaining to vegetable geography; certain forms spreading all over the world; others extending over hemispheres or extensive countries, while some are confined within narrower limits. The more such forms are brought together in geographical proximity in our plant-houses, the more will they serve to exhibit the vegetable physiognomy of their native places. The distinguished Japanese traveller and author Von Siebold observes, that no country produces so great a variety of plants with variegated leaves as that; to produce them forms an occupation among Japanese gardeners, but their procedure is unknown. It is reported that there are plants in Madagascar, which produce many-shaped leaves in one and the same individual (as we see in *Ruizia variabilis* of our hot-houses). Perforated leaves (*folia pertusa*) are likewise said to belong to that Flora. It belongs assuredly to the destination of plant-houses to exhibit and as far as possible to trace such forms.

But physiognomical characters of floral regions ought likewise to be represented, by cultivating such species as are peculiarly suited to that end. Heaths and *Thymeleæ* with their slender branches and minute leaves; the rush-like *Restiaceæ*; the arid, splendid floral heads of *Proteaceæ*; the succulent *Aloes* and *Stapelieæ* from the Cape; the shrubby *Rutaceæ*; the *Epacrideæ*; the leafless *Acaciæ*, with vertical phyllodia, from New Holland; the Mexican Cacti, *Dasylliria*, *Hechtieæ*, *Agavæ*, *Yuccæ*, and *Cycadææ*, should not be wanting in establishments which lay claim to any degree of perfection.

A very important object in our selection consists in plants which possess medicinal, technical, economical, commercial, and the like properties and utilities. Of vital interest among primeval forest trees, are, among others, the Teak, various stately Laurinæ, the light and aromatic woods used in the manufacture of cigars and pencils, the different sorts of Sappan, Brazil, Brazilet, and St. Martha woods, or the red, yellow, and white Sanders (*Cæsalpinia*, *Santalum*, *Pterocarpus*), or the species of *Maclura*, the sources of the divers Yellow woods (*Fustic*) of North and South America, the species of *Myrospermum*, *Copaifera*, *Icica*, and *Hymenæa*, which produce the Peruvian Balsam, the Copaiva oil, the Elemi and Copal resins, the little known, precious, hard and dark-coloured woods of the Palisander (i. e. *Palo santo*, a leguminous tree), the American Rose and Satin woods. These magnificent trees are little known, and either totally wanting in our botanic gardens, or they only exist there in a very stunted and poor condition. But even smaller trees or shrubs, and other perennials of the above class, are rarely or not at all seen in our gardens: for instance, the various *Cassiæ* yielding senna leaves, the plant yielding the ringed, white, and striped *Ipecacuanha*, the different gum plants of Arabia, the incense-producing plants of the East Indies and Arabia, the numerous *Indigoferæ*, from which the dye is manufactured in different countries, the genuine plants of the East Indies producing gambir, kino, and catechu, the Molucca Sago Palm (*Metroxylon*) reproducing itself from the root; besides many others. It is only in later times that, thanks to the zealous labours of Weddell, several species of *Cinchona* have been brought into cultivation, and it is in England only that they have been so fortunate as to obtain flowers, and even fruit, of some of the noblest tropical fruit-trees, such as *Mangifera indica*, *Garcinia Mangostana*, *Averrhoa Carambola*, and *Bilimbi*, *Euphoria*, *Nephelium*, and many delicious large-fruited *Myrtaceæ*, (*Psidium*, *Eugenia*, *Jambosa*). Still even among perennial and annual useful plants are still absent from our glass-houses, notwithstanding our vastly improved intercourse with distant parts of the globe. We still miss many *Cucurbitaceæ* (among these the remarkable *Sechium edule*), the esculent *Oxalis* and *Tropæolum* species from Chili, various vegetables of tropical countries, also oil-plants, and even their different cereals, such as the maize of Paraguay with the seeds enveloped in the large covering (*Pinsingalo* of Buenos Ayres, *Zea Mais tunicata*, *St. Hil.*, *Zea cryptosperma Bonafous*), or the small-seeded sort

found in Peruvian tombs (differing, seemingly, from *Z. Curagua Molina*).

The author concludes his memoir with the following aphoristic summary:—

1. First of all it is to be determined what plants are to be cultivated in a given Plant-house, or its separate parts. The more select the choice, the more judicious their grouping according to habits and culture, the easier and cheaper will be the execution of the structure, and the treatment of its contents.

2. The distinction between a *Serre d'exhibition*, "*ein hohes Schauhaus*" (large stove conservatory?) and a low stove, "*ein niedrigeres Gewächshaus*," must be kept rigidly in view, according to their different requirements; and it is preferable, accordingly, as regards economy and management, to have two separate buildings, instead of one, for accomplishing the objects in contemplation. Plants of low and humble growth should be banished from a large building destined chiefly for trees and tall shrubs, and placed in one of suitable elevation.

3. In the construction of a Stove-Conservatory, it is an important consideration, whether the intention is to exhibit the growth and habit of its inmates, or chiefly their flowers and fruits.

4. In order to favour, in the greatest degree possible, the harmonious growth of the plants, to obtain a uniform development of branches and leaves, such a building must be capable of admitting light from all sides.

5. But this object may be attained in our climate, by admitting light to the North, from above, independent of its indispensable access from the South, and also the East and West; for reflected light acts more powerfully than direct, in proportion as the angle of incidence of its rays is greater.

6. If it is found desirable to apply glass extensively on the north-side, this important result will be attained, that it will contribute towards maintaining as uniform a degree of heat within as possible (by preventing its accumulation in the higher strata of air), and promoting transversal currents.

7. In both the one and the other description of buildings, it is particularly to be attended to, that shade-plants are kept entirely apart from others; if in the same house, they require distinct treatment.

8. The plants which belong to the Stove-Conservatory are those peculiar to the forest vegetation, both the loftiest and ordinary, of their native country; and as the denseness of a forest

impedes the full development of its trees, so does the same happen in a crowded house. Hence the area must be proportionate to the production of branches and leaves. That those structures are in many cases overloaded with plants, is proved by the practice of removing many of these out of doors, into the open air, in summer; the remnant being mostly numerous enough to occupy the entire space, without preventing commodious access.

9. The more spacious the building is, the greater opportunity does it afford for cultivating also plants which thrive under considerable privation of light; that is to say, such of these as are kept irrespectively of their flowering, or which may be accommodated with light at that particular period, or else are accustomed to blossom in the shade.

10. The organisation of trees fits them, in a greater degree than plants of lower stature, to have the loss of light compensated by an increase of temperature in the soil; and they demand, accordingly, especial care in that respect, during the season of the year, when the scanty supply of light indicates a judicious and cautious increase of bottom-heat in the building.

11. Since the forest-vegetation is, on the whole, more dependent on periodical light than the ground-vegetation (*Flurvegetation*), it follows that we must employ a variety and complication of appliances, in order to modify the effect of light and shade, which are less indispensable in the low houses (*propagating stoves*) where herbaceous and the like plants are chiefly and extensively cultivated.

12. These last-mentioned buildings and plants ought to have as much as possible continuous daylight, in conformity to what takes place in their natural place of growth; whereas

13. The lower forest-vegetation demands a strong degree of direct light, and if equinoctial, or from hot tropical countries, a long-continued and uniform increase of heat.

14. The ground-vegetation of various tropical and subtropical regions are subject, sometimes, to a very considerable reduction of temperature, owing to the powerful nocturnal radiation of heat; so that plants from thence should be carefully separated from those which are impatient of any considerable diminution of temperature. It is in this respect that mountain plants from the tropics will bear being associated with those of subtropical regions.

15. As far as it is practicable, such plants only as agree in their periods of vegetation should be associated together in any

description of house ; especially in those cases where the transition from one vital period into another is very energetic, and where the state of rest is in consequence strongly marked. In short, plants of very different periodicity should always be kept apart from each other.

16. In the reconstruction or arrangement of houses, the productions of one and the same native country ought, wherever possible, to be assembled together. It is advantageous to go beyond even the common classification of Cape of Good Hope houses, New Holland houses, etc., and to establish single floral regions, in separate buildings, or divisions of them.

17. Whenever it is required to subdivide and accommodate a house for different cultures, those plants which are nearest allied in their life-periods ought to be grouped together ; while others, which differ greatly on that point, should be kept farthest remote from each other.

18. In selecting the proper site in a given locality, the first consideration should be, whether the intended building admits of being erected at right angles to the meridian, or at what declination from it ; and consequently, what light can be obtained at certain times of the year, or the day. So likewise must attention be paid to the peculiarities of the climate in which the garden is situated, in apportioning the different localities in the building itself. Under this head comes especially the direction of the prevailing winds at different seasons, by which the temperature of one or the other aspect of the house may become particularly lowered.

19. According to the nature of the plants in the house and its subdivisions, the amount of moisture given to them by various contrivances must be regulated. The antiquated terms *hot and moist*, *hot and dry*, *cold and moist*, *cold and dry*, find an application here to some extent ; for example, plants from dry places require being heated exclusively by means of hot air conveyed in pipes, while others are best suited by tubes conveying hot water, or by a regulated admission of warm vapours. On these important differences depend the terms of *dry* and *damp* stoves (to which latter belong those for *Orchideæ*) ; but as we become nearer acquainted with the wants of certain families and floras, according to the degree and periodicity of a variety of influences, we shall have to proceed further in these subdivisions ; and this points out, that the cultivation of *Orchideæ*, *Ferns*, *Bromeliaceæ*, *Aroidæ*, *Scitamineæ*, etc. ought, as far as practicable, to be kept asunder.

20. The ventilation of the building is another point of great weight ; for free air furnishes not only the *pabulum vitæ* to plants, causing the manifold internal movements of vegetation ; but it promotes the act of impregnation, among others by the aid of small insects. The cultivator has moreover the power of adding certain gases to the atmosphere in the house, which may serve, under certain circumstances, to promote vegetation.

21. Aquatic plants being, with few exceptions, of humble stature, their cultivation belongs properly to low stoves. Some kinds of a taller growth might be suitably provided for in conservatory stoves by placing them round fountains or artificial cascades. They will however attain their greatest perfection in stoves especially devoted to their culture, and heated by hot water.

VII.—SOME ACCOUNT OF THE HORTICULTURE OF TACNA IN PERU.

By John Reid, Esq.

(Communicated by Wm. Reid, Esq., Rose Bank.)

THE cultivation of Tacna, as well as that of all other parts of the coast of Peru, is carried on by irrigation. The small stream, dignified by the name of river, has its rise in the neighbouring mountains : and the “chacras” or farms extend on either side from where the water leaves the ravine to about two miles below the town, beyond which point the moisture rarely or never reaches. The whole length of the cultivated track is about twelve miles, but its breadth is extremely unequal, caused by inequalities of the surface in some places, and the stony and uncultivable nature of the soil in others ; in no part, however, does it exceed a few hundred yards, and 3000 acres may be taken as a fair approximation to the area of the whole cultivated land. When the Spaniards first took possession of Peru, they parcelled out the ground along the rivers on the coast amongst the Indians, allotting to each division its proportion of water, and fixing the hours at which it was to be taken ; this original regulation is still followed. The valley (all cultivated tracks in Peru are called valleys) is divided into seven districts, to each of which the river belongs exclusively, on one certain day of the week, and is subdivided among the farms of that part, under the superintendence

of a "principal," named yearly for the purpose. The whole body of water in ordinary times occupies only a channel about four feet in width, by sixteen inches deep, and runs with a very moderate current, so that it is astonishing to see the effects it is made to produce; three hours weekly of the twentieth part of this streamlet is called a "particion," and is barely sufficient for about two acres, which seems to have been the extent of the original divisions.

Where water is so precious, of course great care is taken in applying it in the most economical manner; the ground is divided into a series of squares, of six or eight yards on the side, by ridges of earth thrown up between them, sufficiently thick to resist the water, and to serve as footpaths or alleys; these communicate with each other, and are successively filled with water to the depth considered necessary; or ridges are thrown up in parallel lines, through which the water flows in a zig-zag direction, until all is sufficiently moistened.

The staple productions of the valley are "Alfalfa" or Lucerne, and "Mais" or Indian Corn; the first for the support of the large gangs of mules, and the last forming an important item in the food of the people.

When Alfalfa is to be sown, the preparation made for it is scratching the soil to about the depth of six inches, with a plough formed of the trunk of a crooked tree, and drawn by a pair of oxen; the ground is then divided into "eras," or squares, by the "lampa," a heavy, ill-formed, concave shovel, made in the country, and the only implement besides the plough they ever use; the surface of the beds is then levelled, they are watered on next watering day, and sown, as thickly as we sow Cresses at home, in a few days after, the seed being covered in by dragging a branch over the surface. In the course of two months the Lucerne is fit for cutting; an operation ingeniously and elegantly performed by means of a "cuchuna," or the blade of a common table knife, tied at right angles into the end of a slit piece of wood, the operator meanwhile being on his knees. Shortly after cutting the ground is again irrigated, and thus alternately cutting and watering the plant retains its vigour for years, giving, when well attended to, eight or nine crops annually, and this without manure of any kind except a slight powdering of guano every second year.

After the Lucerne, in point of importance, comes the Indian Corn. For this crop the ground is formed into ridges with the lampa, and the seeds flung into holes, six or eight in each, at the distance of fifteen inches, and covered in with the foot, the usual

watering then follows, and in a fortnight after the braird is several inches high. The general crop is sown about the end of June, and reaped in December, the return being from 300 to 500 fold, although even this might be greatly increased, were the plants grown at a greater distance from each other, for more than one half of them are literally smothered. This grain is a most exhausting crop, and its success depends altogether on the application of guano, a substance I shall now attempt to describe.

Guano, or huano, is a reddish brown earth of a disagreeable smell, found on several parts of the coast and the small rocky island adjoining; it is supposed by some to be the decomposed excrement of sea birds, millions of which still frequent the neighbourhood of the places where it is found, whilst others contend that it is a fossil earth of a peculiar kind. The strongest arguments are on the side of the former opinion; the upper stratum of the beds is always white, and evidently the recent deposition of birds; it is found gradually darkening in colour, as it deepens, and for several feet under the surface, the bones and feathers of birds are plentifully discovered in it; nor is this all, it has been examined by French chemists of eminence, who pronounce it as of animal origin. Opposed to these mighty facts, is the difficulty of conceiving it possible that any number of birds, even in a period of time as remote as the wildest tradition of Chinese chronology, could have sufficed to produce the guano in the immense quantities in which it exists. It seems, indeed, inexhaustible; there are large hills of it hundreds of feet in height still untouched, and the supply in our time is still drawn from the very same deposits that furnished the Indians with manure anterior to the conquest. Numbers of small vessels are employed in carrying it to the different ports, where it is generally sold at the rate of from 10 to 12 reals (5s. to 6s.) per funega, nominally weighing 150 lbs. and is conveyed on jackasses to all parts of the country within fifty leagues of the sea.

Before using the guano it is mixed with three or four times its bulk of dry horse-dung, broken down to chaff, not for the purpose of adding any new or increased virtue to it, but to make it more easily managed, and to increase the volume of the substance to be handled, and thus facilitate its economical distribution. When the Maize is a few inches high, owing to the poverty of the exhausted soil, it always assumes the appearance of, what at home is technically called, "setting up;" it gets yellow, hard, and sickly looking, and this is the signal for the first application of guano.

One man, with a "lampa," makes a small hole at the root of every clump of plants; another follows with the guano in a bag, who, dropping a little of the compound in the hole, covers it in with his foot; irrigation follows, and within a few days the appearance of the braird is totally altered: it is now green, succulent, and healthy, and grows with a rapidity and vigour hardly credible. Just before the plants cover the whole surface, the process is repeated and the cares of the husbandman are at an end till, in due time, he gathers in his abundant harvest. Now, when it is considered that three bushels of this manure is sufficient for an acre of corn, growing to the height of eight or ten feet, and that each clump of five or six such plants does not get more of it in all than about half an ounce in weight, its nutritive qualities must be allowed to be most wonderful, and far to exceed bone-dust, or any of the agriculto-chemical discoveries of England.

POTATOES are grown in considerable quantities, but they are never good, either the climate or the water disagreeing with them; they produce abundantly, but do not seem to ripen, and are always watery and insipid, whilst those grown by the Indians on the skirts of the Cordillera, from 6000 to 8000 feet above the sea, and brought here for sale, are excellent. They are planted like the Maize in ridges, at all seasons indifferently, but the principal crop is put into the earth in June, and gathered in September, in an abundance proportioned to the guano and water it has received.

CAPSICUM, OR AJI.—This pungent seed-pod is here reckoned an indispensable necessary of life; it is used, in some form, in all sorts of food, is eaten alone, with bread or Potatoes; beaten into a paste, betwixt two stones, a plateful is on every dinner-table; whilst soup, stew, and salad all witness separately to its presence. Various kinds are cultivated, but the sort of most value, and the most productive of all, yields a long, coarse-looking, and almost black pod. The plants are raised on a seed-bed sown in July, and planted out on previously well-watered ridges in October and November. When freely irrigated, for Aji requires more water than any other crop, and supplied with the necessary guano, the growth is extremely rapid; in April the first pods are ripe, and there is a constant succession till the end of August; they are gathered as they mature, dried in the sun, and then packed up in sedge bags, holding an arroba or 25 lbs. each, for sale. The valley of Tacna produces but little more Capsicum than what is necessary for home consumption, the interior being supplied by

the neighbouring valleys of Sama, Asapa, and Lluta; some thirty years ago, the value of this crop in the province of Arica was reckoned at 600,000 dollars annually! it can now be but a small fraction of this large sum, the scarcity of water in Asapa, the ruin brought on many estates by the devastations of the revolutionary war, the almost total breaking up of slavery, and the general poverty of the country, are the causes which have brought about the diminution.

The utter ignorance of the people here, of the very first principles of vegetable economy, is in nothing more conspicuous than in the management of this, their most valuable crop. The seed is sown as thick as it can lie on the surface, and the plants of course, deprived of air, become drawn and weak; nothing would be easier than to prick them out on a succession bed, where they would soon acquire strength in both root and stem, but this simple plan is never thought of, and those to whom I have recommended it are too idle, or too prejudiced, to adopt the practice. When the seedlings are "drawn" to the height of a foot or fourteen inches, they are considered sufficiently *long* (not *strong*) to plant out; and as it is evident that a great part of plants so raised must die under the heat of a tropical sun, recourse is had to the ingenious device of sticking two or three into the same hole! the consequences are self-evident: if one plant survives, it is still only a comparatively weak single-stemmed thing, with a bush of branches at the top, liable to be broken over by a puff of wind, or the passing friction of any animal; should two or more happen to live, their energies are spent in a struggle with each other—they are jointly and severally deprived of the necessary air, the original process of drawing is followed by that of smothering, and a corresponding diminution in the produce is the necessary consequence.

ONIONS.—This bulb is used in great quantities, it being a principal ingredient in the "chupe," or stew of the country. I have never seen it raised from seed; in fact, the process would be considered too tedious a one by our "chacareros:" the only kind grown is what is called at home, I believe, the Tree Onion, which produces its succession in a bunch of small bulbs on the top of what, in other plants, would be called the flower-stalk. These bulbs are sown in ridges, four or five always adhering together, and, with guano and water, soon swell to a large size; but they are not considered in perfection until they have "shot." Previous to this time they are called "hembras," or females, and

looked upon as immature and insipid ; when, however, the seed-stem has fully developed itself, and “ a rung ” as hard and as dry as a Bamboo cane occupies the heart of every bulb, they are dignified with the title of “ Zebollas machos ” (male Onions), and thought worthy of all acceptance. Nothing appears more ridiculous to an eye accustomed to the gardens of Scotland than a large bed of Onions in Peru ; in the vigour of its growth, it appears as a mere jumble of immense, irregular clumps of green stems running into seed at high pressure power ; and when the water is withheld, for the purpose of ripening the crop, within a month it has all the resemblance possible to a field of half-burnt, sun-dried Canes. The clumps are seldom divided ; they are generally in size larger than a man's hat, and the tops being cut off, they are sent to market in their primitive state. The plant is grown at all seasons, but the superfine hard-hearted ones are raised in greatest perfection from June till December. Of course, anything like a round or civilised-shaped Onion is never seen here, that being quite incompatible with the presence of the “ rung.” I hope I have spoken on this subject with no undue asperity. I am and always have been fond of this vegetable ; and it is no joke to have my teeth—the few the toothache has left me—continually exposed to lesion when I choose to venture on an Onion.

CABBAGE.—Of Cabbage, only one kind is grown here ; and if a specific name was wanting for it, I can think of none more *apropos* than the “ Coarse Everlasting ; ” its heart, although not quite so hard as the walking-stick, is sufficiently so to justify the former epithet, and, as it does not run to seed, but is propagated by offsets from the old stem, roughly torn off, and as roughly stuck into the soil, the latter seems not misapplied. This plant affords one of the many instances of the power of a long-continued habit, over natural tendency. There cannot be a doubt that, like all other species of its tribe, it originally ran to seed in its second year, but the continual interference of man, in checking this propensity, by breaking off its branches, has at length, in the course of time, almost eradicated the principle, and it would now be no easy operation to force it into flower.

CAULIFLOWER.—This excellent vegetable is plentiful in Chili and Lima, but has only lately been brought to Tacna. About three years ago some hundreds of plants were raised in one of the “ chacras ” in the vicinity ; in due time they were planted out, and produced very fair heads ; the propagation, as of Cabbage, by offsets. was tried, but this member of the Brassica family would

by no means consent to it, and the result has been that the sprouts from the original stems are cut off as they appear, and sold for "Coliflores;" while the parent stems are gradually approaching that ligneous state, when neither leaves nor flowers can be produced by them, and unless a new generation from seed be speedily obtained, the Cauliflower, as formerly, will become unknown.

LETTUCE.—Of all European vegetables this is the one which is produced here in the greatest abundance and perfection; there is but one sort, and it appears a hybrid between our long green Coss and Cabbage kinds; little care is taken of this plant, it is generally self-sown from the numbers that are allowed to run to seed, which is sold for bird's-meat at 1s. the pound, and thus produces heads as large, and nearly as heavy, as our best dwarf Cabbage in Scotland. It is in season all the year round and is in universal use.

I have now mentioned the principal vegetables of European extraction in cultivation here, and although a few others are now and then met with, they are hardly worthy of a separate notice. We have occasionally, as a paper of seed may chance to arrive, a few Carrots, and they are good of their kind, and seem to agree well with the climate and soil. Radishes I have once or twice seen, but as the growers did not think they had arrived at perfection until they were adorned with a flower several feet in height, it was found that even boiling could not reduce the root to a fit state for mastication, and it was voted into oblivion forthwith. Beet-root, of the Turnip-rooted kind, is to be found in one or two places; it is boiled and eaten cold with oil and vinegar as a salad. I took it into my head, some months ago, to make a bottle or two of Beet-root pickle, and applied to an old clergyman, a friend of mine, who prides himself on having *all foreign* plants in his garden, for two roots, for that purpose; he answered me that they were yet too young, but that he would not forget me at the proper season, and I thought nothing more about the matter. About a fortnight ago he sent his servant, bearing on his shoulder four roots, each with a seed-stalk as thick as my arm, and above 4 feet long, assuring me that he had now the immense pleasure of complying with my request; but I very ungratefully returned them to him, with a written recommendation that he should cut them down into gumsticks, and make his penitents chew them soft, before he gave them absolution. I went down next day to see my friend the "Padre," and I found that he had cut each root

into four pieces, and replanted them again, so that, as he said, they might not be lost ! We have a small long-pod Bean grown here in considerable quantities, but it is never topped, and this produces only a few pods in perfection at the upper extremity. I ventured one day to suggest this simple operation to the Padre, but he treated the very idea with contempt, scientifically illustrating his opposition, by asking me if it would conduce to my health to be made a head shorter ? The logic was unanswerable, the old man had made out his " *reductio ad absurdum*," and I had nothing more to say for myself.

Parsley is a much esteemed plant, but seems always, I know not from what cause, extremely scarce. Celery is unknown in a cultivated state, but grows wild in the ravines of the neighbourhood.

Mint, Chervil, Dill, Basil, and Marjoram, are grown and used, but Sage and Thyme are unknown. The leaves of Prince's Feather and Love Lies Bleeding, both wild and indigenous plants, are boiled, and eaten as we do Spinach, and are tolerably good. The Tomato, or Love Apple, is produced in abundance, and enters, boiled and raw, into the composition of many dishes. Turnips have been frequently sown, and at proper seasons I have no doubt would do well, but in the experiments hitherto made, were never thinned out, and of course came to nothing.

I have stated above that the Potato of Tacna is not good, but this in a great degree is compensated for by the excellence of the Camote, or Sweet Batata, a *Convolvulus* producing large, nutritive, and well-tasted roots ; the Arracacha, something like our Parsnep ; and several varieties of Pompions, which are truly excellent ; and all these valuable plants require no further care than an occasional watering.

Of fruits in this valley we have hardly one species peculiar to the latitude or the country, but an abundant supply of tropical kinds is brought from the warmer places nearest to us ; the few we have are as follows :—

Figs, of excellent quality and in great abundance ; the trees grow to upwards of forty feet in height, and no care is taken of them whatever ; the first crop is ripe in December, and the second or main one in March and April.

Grapes, of several kinds in plenty, but not nearly so fine in quality as those brought from Locumba, twenty leagues to the north, where immense quantities of wine and brandy are made

from them ; Tacna had at one time extensive Vineyards, but some prejudicial change took place in the quality of the water, and they were given up.

Olives are abundant, and those who like them say they are superior ; the demand for the table is so great that hardly any oil is made near Tacna : they are eaten here when quite ripe, black, and full of oil. A full crop of Olives is only obtained every third or fourth year, and the reason of this, I have no doubt, is to be found in the clumsy and destructive way in which the fruit is gathered, the branches being beaten with canes until the Olives fall on mats placed under the trees to receive them, and this rough work cannot fail to destroy many of the fruit-buds on the long, tender, and wiry branches.

Peaches of three or four sorts are abundant, and the people are very fond of them, looking on this as the healthiest of all fruits ; it may be so, but those grown in Tacna have nothing else to recommend them ; they, with the exception of one kind, are hard and flavourless, never ripen properly, and in fact do not agree with the locality ; they are in season in January and February.

Pears are of two kinds, a small one in shape and size resembling the "Green Chisel," in immense quantities, and another, a small Bergamot, not so plentiful ; neither sort will keep above a few days, and it is astonishing how so many can be consumed during the very short time they remain in season ; they ripen in December.

Apples : We have but one kind, something like a "Keswick Codlin." The trees are stunted and cankering, and do not thrive ; they are first raised from cuttings, and afterwards ingeniously grafted from the same tree ! In Lima there are several good sorts, and this fruit, wrought on proper stocks, would be sure to do well here.

Pomegranates : All the hedges are of this plant, and they bear fruit in abundance, but no use is made of this most beautiful Apple.

Mulberries are plentiful and fine. Any other nation than the Spaniards would have introduced the silkworm in Peru.

Strawberries are sometimes seen as a curiosity, but of an indifferent sort ; the necessity of irrigation excludes the fruit.

Plums of one kind, like the Black Jack, are mostly brought from the higher valleys on the borders of the Cordillera.

Melons, both musk and water, are grown in the greatest abundance, and are very large and fine ; the seed is sown in

ridges, in October and November, gets a little guano afterwards, and the produce is reaped in thousands from January till May.

Oranges, Lemons, Limes, Guavas, Pacays, Plantains, and Granadillas (the egg-shaped fruit of a Passion flower, with a pulp exactly like a Gooseberry), are all grown in small quantities in Tacna, but the principal supply of them, and other tropical fruits, is derived from the warmer valleys in the province.

POSTSCRIPT.—In the above hasty sketch, I find no notice has been taken of two important productions, viz. Cotton and the Sugar-Cane. Cotton is grown in considerable quantities; it is of the perennial kind, and forms a dwarf tree of eight or ten feet high. The plants are raised from seed, and begin to bear when two years old; 100lbs. of the Cotton, as taken from the plant, weigh only 40lbs. when separated from the seed. The Sugar-cane grown in Tacna is sold to and eaten by the lower class of people, and is never manufactured.

The climate of Tacna is one of the finest in the world; although 6° within the southern tropic the extremes of heat common to the same latitude, in other parts of the world, are here unknown. The fervid rays of a vertical sun are tempered by the daily trade-wind sweeping over the bosom of the Pacific ocean on the west; while to the east, and at the distance of only about forty miles, rise the mighty snow-covered turrets of the Andes, whose pure atmosphere of everlasting frost also lends its influence in tempering the solar rays. But much of the moderation of the climate depends on the open nature of the country in the immediate neighbourhood; in other valleys, only a few leagues off, which are shut in by high hills on either side, the free circulation of air is impeded, the direct rays of the sun are strengthened by the reflected heat from the inclosing hills, and the temperature at certain seasons is insufferably warm. Every modification of climate is to be met with in Peru; in open situations, at 2000 feet above the level of the sea, we have the genial temperature of Tacna; at double that height, the region where Wheat begins to be cultivable; at 6000 feet a region of perpetual spring; at 8000 feet the Fig-tree becomes stunted and dwarfish, but Wheat is in its native climate; and at 10,000 feet we are on the high plains of the Cordillera, in the region of Condors and Guanacors and Vicceñas; where the Indians rear their flocks of llamas and sheep on the scanty vegetation, and extort from the unwilling soil a miserable half-ripened crop of Barley and Quinua for their own subsistence. But even here

other climates are still observable; these immense plains, hundreds of miles in breadth, are but the base for other mountains as high above their surface as they themselves are above the sea! and along the side of which is distinctly visible that definite and unerring line where all vegetation ceases! a narrow barren zone is then observable; and this is succeeded by eternal snow, the inferior limit of which, in this latitude, seems to be about 15,000 feet above the level of the ocean.

VIII.—NOTICE OF A NEW CHINESE SPIRÆA (S. REEVESIANA, FL. PL. ?) DISCOVERED AT FOO-CHOW-FOO. By R. Fortune.

DURING my last visit to China I discovered in a garden at Foo-chow, on the river Min, a very beautiful double Spiræa, which I think will prove a great acquisition to our gardens in Europe and America. I had no opportunity of seeing it in flower at Foo-chow, but I took a plant north to Shanghai, and presented it to Mr. Beale, in whose garden it flowered in 1850. It was from this my specimens were taken, which are amongst my last collections of dried plants. When these were gathered I had no idea of the beauty of this variety when in good health and in full flower, but I have seen it again this spring under more favourable circumstances. In the month of April it was loaded with daisy-like blossoms of the purest white, each as large and as double as the Spiræa prunifolia introduced by the Society through me some years ago. (The accompanying drawing kindly made for me by Mrs. J. C. Smith of Shanghai will give a good idea of the beauty of this fine shrub, and I also enclose a portion of a dried specimen for your inspection.*)

The winter of 1852-53 at Shanghai was a severe one—more severe than had been experienced for some years—but this Spiræa has not been affected in the slightest degree, and seems quite as hardy as Spiræa Reevesiana, or perhaps more so. Although found in cultivation at Foo-chow, it has evidently a more northern origin, and as it is not met with in the gardens of Ningpo or Shanghai, it is probably one of those Japan plants introduced to China by the Loo-chow trading junks which visit Foo-chow every year. In 1845 I boarded two of these junks at the mouth of the

* These illustrations were received, and confirm Mr. Fortune's statements.

river Min on their homeward-bound voyage, and observed a number of Foo-chow plants which the sailors were carrying over to Loo-chow, and I have no doubt they also bring Loo-chow and Japan plants to Foo-chow. But whether the shrub in question be a Japanese plant or not, there can be little doubt of its proving perfectly hardy in England, and if it flowers as it has done at Shanghae this spring, I am sure it will be greatly admired. As it flowers early in the year it will probably be well adapted for forcing, and if so, its beautiful wreaths of snow-white blossoms will do well for bouquets or for ornamenting the hair; for the latter purpose it is much prized by the Chinese ladies at Foo-chow.

NINGPO, August 14, 1853.

IX.—ON THE PRICKLY-FRUITED AND DOUBLE-FLOWERED STRAWBERRIES. By Professor L. C. Treviranus. Read before the Association of Naturalists for the Rhenish Countries and Westphalia in May, 1853.

(Translated from the German by Dr. Wallich, F.M.H.S.)

NOT only is the nomenclature of varieties, which are objects of horticulture, a very difficult matter; but their origin and history occupies a very obscure part of vegetable physiology. The complaint of Vilmorin (in *Linn. Transact.* 2 Ser. II. p. 349) that varieties are too little inquired into, does not affect the botanist. Among a number of genera, the Strawberry is peculiarly rich in forms, some of them striking and curious. M. Duchesne, an advocate in Paris, who lived during the last half of the past century, and corresponded with the greatest botanists of the time, Haller, Linnæus, the Jussieus, Lamarek, &c., devoted his spare time to this genus; for which he must have enjoyed many favourable opportunities, as Haller says of him, that he was born in “mediis hortis.” The fruit of leisure hours was, besides his memoirs on cucumbers and cabbages, his *Histoire natur. des Fraisiers* (Paris, 1766), his treatise *Sur les Fraisiers* (Encycl. Botan. II. 1786), and the article *Fraisier* in *Nouv. Cours d'Agriculture* (VI. Paris, 1809). These papers contain a great deal of research derived from nature, and form therefore the principal sources of our information respecting the

various forms of the genus of Strawberry. On the present occasion we shall speak only of two of those forms, namely, of what he calls the Plymouth Strawberry, which is the prickly fruited of Linnæus, and of that with double flowers. The character of the first of these, which does not differ from our common wild Strawberry in growth, stem, and leaves (rather I should say, did not differ, for it exists no longer) consists in bearing smaller petals than usual, which are greenish and terminated each by three or four toothlets. The fruit—that is, the berry-like receptacle—is thickly beset with greenish hairs, which are nothing else than mishapen ovaries, elongated above in a long straight or curved point, soft at first, but afterwards becoming hard and stiff; there being no sign of any style, which, as is known, originates from the base of the ovary. (*Duchesne Herb.* p. 93.) Barrelier (*Plant. Ic.*, 90) has exhibited the character of the fruit, also the flower, which is tolerably good; at least, it is better than Zanoni's (*Hist. ed. Monti*, t. 78, f. 1). This monstrosity (for it is clear from the description that such it must be) was first exhibited by Parkinson in 1629 in a poor woodcut, and next described by Johnson in 1633. Since then the plant is mentioned in various works, and last of all in 1686 by Ray, since which time it seems to have disappeared from all the gardens of England and on the continent of Europe. It must therefore have been on the testimonies of those authors that Linnæus published the plant as a second species of Strawberry, which he called *Fr. muricata*, giving it characters which do not exist in nature. It was only in his last work on plants, namely the *Mantissa secunda*, that he corrected his error and declared that *Fr. muricata* was only a variety of *Fr. vesca*. The most remarkable feature of this monstrous form was, that a so-called berry was produced notwithstanding the impaired fertilisation on account of the deficient style, that it was eatable after removing the prickles, and, though pronounced bad and tasteless by Zanoni, was considered palatable by Barrelier. The same is the case with the other of the two varieties, namely the double and semi-double one. This too originates from England, for it is called *anglica* (the English sort) in the writings which first treated of it, and was likewise known already in the middle of the seventeenth century. Fortunately, this form has not perished like the last, but is still preserved, and the specimens which I have now the honour to exhibit are from the garden here of the horticulturist, Mr. Günther. With exception of the flower, you will find no difference between it and

the common Strawberry. The tips of the calyx are a little elongated; the greenish-white, sometimes red-margined petals, instead of being in one row, are produced in four or five rows; the number of stamens does not exceed fifteen, sometimes not ten; occasionally none are clearly developed; the anthers flat, frequently one half changed into a petal, and contain occasionally some pollen consisting of transparent vesicles not changed in water, and therefore seemingly destitute of fovilla. Although the usual number and form of petals exist, fertilisation can hardly take place; * the receptacle swells, nevertheless, as in the perfect forms of the plant, into a so-called berry which Duchesne mentions as being somewhat smaller than the common sort, but otherwise of the same colour and taste, while Barrelier pronounces it as being larger, of reddish colour, and excellent flavour. The circumstance which occurs in some plants (I will adduce only the Banana and Pine-apple among monocotyledons, and the Hop and Mulberry among dicotyledons) that a perfect development of fruit, though with barren seeds, will take place without the process of fertilisation, while in most others, under similar circumstances, no fruit is produced, is in the highest degree remarkable, and is a fact which has hitherto received no sort of satisfactory explanation.

X.—A BRIEF SKETCH OF THE PRESENT STATE OF THE QUESTION
RELATIVE TO THE VINE MILDEW. By DR. C. MONTAGNE.†

My design in this general survey of the cause and progress of the fatal malady which has for some years affected the European vineyards, is to state briefly and methodically the principal facts which are scattered about in the multiplicity of pamphlets, reports, and documents which appear daily from every quarter. The question affects so gravely one of the most important branches of our rural economy, that I have thought that it would not be an ill-timed and much less a useless task to review its past history, to follow the different phases under which it has appeared, and

* I must remark, however, that later flowers must have contained active pollen, for I found well-formed fruits, containing perfect embryos. (Subsequent remark by the author.)

† Translated from *Coup d'œil rapide sur l'état actuel de la question relative à la maladie de la Vigne* par le Dr. Montagne. Paris, 1852.

finally to indicate the present state of the question. I do not conceal from myself the difficulty of the task, nor the feebleness of my own powers for its accomplishment; I trust, however, to make up any deficiency by my ardent desire to be useful.

Historical. All the authors who have treated of the Vine Mildew have properly inquired whether there are any indications of it in earlier times. Many have gone back as far as Theophrastus, the author of the most ancient work on Botany. Two passages appear in this author, who lived three centuries before the Christian era, which have been supposed to indicate the existence of the same malady in those remote ages. The first passage is as follows:—"Such are the diseases and affections of the trees themselves. There are also diseases of the fruit, as for instance that of grapes called *κραμβος* (burnt or scorched), which resembles rust. For it takes place when the sun burns more vehemently after the falling of the dew. The same thing happens also to the leaves."

It is easy to perceive that this malady of the bunches, which the Greeks call *κραμβος* and which Theophrastus compares to the rust of corn, has no relation to the Oidium; at the furthest, we find only the brown spots on the berries and leaves which are produced by the Oidium; but even this much is uncertain.

The second passage is a little more explicit, but not much more conclusive. "There is also another disease in the olive trees called Arachnion. It is produced on them and destroys the fruit. The rays of the sun, also, sometimes burn the olives, grapes, and other kinds of fruit."

Such are the words used by the author, in which it is clear there is no mention of any disease, but a mere intimation that, like other fruits, grapes are sometimes injured by the rays of the sun when unusually fierce.

Pliny, however, who has reproduced this passage, explains the term Arachnion and extends it to grapes, of which Theophrastus does not say a single word:—"Est etiamnum olivis et vitibus (araneum vocant) cum veluti telæ involvunt fructum et absumunt."

This is all that appears on the diseases of grapes in ancient authors, and even this must be strained to accommodate it to the present malady. We may, however, allow that there is, if not a perfect identity, at least a very great analogy between the Arachnion and our mould. I shall only remark that Theophrastus and Pliny do not insist sufficiently on its injurious influence to make us think that at this remote epoch its diffusion was as extended and its

action as fatal as in our times, and since many other moulds, as *Tricothecium roseum*, *Polyactis vulgaris*, &c., grow upon grapes when approaching decomposition, it is still very doubtful whether these authors were acquainted with the *Oidium*.

Amongst the authors more nearly approaching our times many passages of Rannazzini (*Constitutiones Epidemicæ Mutinenses*, p. 115. 1690) have been quoted, which refer rather to *Uredines* or *Cladosporium herbarum*. The most striking is as follows: "Sicut enim anno huic præcedenti hæc lues (rubigo) rubro colore fruges infecerat, ita hoc anno, non *cretâ* sed *carbone* notando easdem magnâ atredine resperserat." This has clearly nothing to do with our *Oidium*, which is white.

We find moreover in a modern Botanist, who has long dwelt in the United States of America, and who has described its mycological productions, the indication of an Erysiphe, which he has called *E. necator*. This Erysiphe, which attacks the grapes of some cultivated varieties of the *Vitis Labrusca* and destroys them, (*ubi omnino evoluta hæc species destruit uvas*) may possibly be the same fungus as that which now attacks our vines, or one very nearly allied. Another species, which he calls Erysiphe *Mors Uvæ*, because it attacks exclusively the fruit of the Gooseberry, constitutes a grievous malady, sometimes causing the fruit to perish for many successive years. Schweinitz speaks of it as follows:—"Species nostra . . . tam vulgatissima in Pennsylvaniâ. . . tam lethalem morbum his (*uvis Grossulariæ*) infert ut hortulani vix valeant nisi tempore faustissimo hos fructus deliciosos educare apud nos. Antequam maturitatem nempe in illis nascens tomento aut hyphasmate suo ita hos circum circa investit atque constringit ut enecantur nec possunt comedi. Quibusdam equidem pluribus annis vix singulam invenies illæsam ab hoc hoste." I the more willingly transcribe this passage because it seems calculated to explain certain facts which are daily occurring under our eyes.

I shall not dwell at length on the history of the appearance of the vine mildew, or, if you will, its reappearance amongst us. Every one knows that it was first observed at Margate in the stoves, and according to some in the open air, by a gardener named Tucker, a name at present of such mournful celebrity, and described by my friend the Rev. M. J. Berkeley in the *Gardeners' Chronicle*, Nov. 17. 1847. Its manner of production is difficult to explain, though it is easy to relate how from thence it proceeded to infest in its unceasing course all the vines of Europe. It is enough in

fact for this purpose, to know that it is reproduced by the easy dissemination and rapid germination of its spores which are formed in such prodigious numbers on its fertile stems.

The Biological Society will remember that I was the first in France, not perhaps to denounce the malady, but to give a description of it, accompanied by its proper name, which was inserted in the *Compte Rendu* of the Session of May 11, 1850, and in the *Bulletin* of the first of May of the same year.* Since that period the malady proceeding from the stoves of Versailles extended to the trellises, and from thence to the neighbouring vineyards, till by degrees it has attacked the whole of Europe and has extended even to Madeira.

Etiological. Were we to judge from the concurrent efforts to throw some light on the origin and nature of the evil, one would imagine that nothing is clearer than the etiology of the vine mildew, that universal pest which menaces the future welfare of our vine-producing departments, and which has already produced such disasters. But alas! we should make a great mistake if we thought so, for there is little agreement on this point. Amongst those who have endeavoured to trace out the source of the evil, there are two principal opinions diametrically opposite. The one assumes that the vines are intimately affected as regards their physiological functions, without however saying exactly how; and that it is in consequence of their morbid state, attributed sometimes to plethora, sometimes to radical weakness, an argument as we perceive extremely shifty and elastic, that the parasitic fungus is enabled to establish and propagate itself on parts already diseased. The others, on the contrary, amongst whom I am one, attribute to the presence of the *Oidium* the essential and sufficient cause of all the injury inflicted on the vines and grapes.† Among competent persons who profess the first opinion we may quote Béranger, Count Brignoli, Baron Cesati, Crocq, Decaisne, Léon Dufour, Guérin-Méneville, Heuzé, C. Laterrade, reporter

* M. Dupuis has claimed the honour of having first observed it on the borders of the Rhone in 1834, and of having recorded it in the *Annals* of the Agricultural Society of Lyons for 1839. This is possible, but it still remains to be shown that M. Dupuis was acquainted with the fungus which either causes or accompanies it.

† Mohl, in his first memoir (see my translation in the *Memoirs of the Imperial Agricultural Society*, Part I., 1852), compares the action of the *Oidium* on the grapes to that of a parasite of another order, *Achlya prolifer* Nees, or *Saprolegnia ferox* Kütz., upon fresh-water fish. See *Robin Hist. Nat. des Végét. parasites sur les Animaux vivans. Nouv. éd.*, 1853, p. 372. See also this journal, April, 1852.

of the Bordeaux Commission, Letellier, Lèveillé, C. des Moulins, reporter of the Orleans Commission, Oudart, Panizzi, Targioni-Tozzetti, and Count de Treviran.

Amici in his memoir, and Victor Rendu in his remarkable report to the Minister of the Interior for Agriculture and Commerce, remain in a state of philosophic doubt, and do not venture to pronounce for either the one or the other opinion.

Those who adhere to the second opinion, viz., that the *Oidium* is the cause of the disease, are Berkeley, Berthola,* reporter of the Turin Commission, Bouchardat, Cuppari, Gaddi, Keller, Louis Leclerc, Hugo Mohl, Morren, Payen, Marquis Ridolfi, Savi, Tulasne, and Visiani and Vittadini, reporters of the Venice Commission. The latter view has been signally confirmed by a discovery made by the Venetian botanist, Zanardini, a distinguished phycologist, and the reporter of the Venice Commission. He has shown, by microscopical observations, that the threads of *Oidium Tuckeri* throw out at irregular intervals on their under side certain processes which serve at once as means of attachment to the subjacent tissue, and as suckers, by means of which the juices necessary for the sustenance of the fungus are imbibed. This discovery, sanctioned by every member of the commission, has been recently confirmed by a celebrated botanist, Hugo Mohl, a corresponding member of the French Academy. He has deeply studied the disease; and in two memoirs,† both of which, in consequence of their importance, I have translated, he details the facts which he has observed in Italy and Southern Switzerland.

I cannot enter into the details which the interesting observations made by Mohl through two consecutive years would require. The facts which he adduces appear to me irrefragable.‡

Now, if without the slightest degree of prejudice or party spirit

* Those who have still any doubts may be confidently referred to the report of Berthola. He exhausts the arguments for and against, and remains convinced that the *Oidium* is the primary cause of the vine mildew. Those who do not read Italian will find a translation in the report of the Bordeaux Commission by Dr. Cuignéau.

† The translations were read before the Imperial Society of Agriculture, April 7, 1852, and Nov. 9, 1853, and are printed in the Transactions of the Society. A translation of the former memoir will be found in this journal April, 1852, and of the second, Jan., 1854.

‡ In the original a long extract from Mohl's second memoir follows, which it is unnecessary to reproduce here, as it will be found in our last number from p. 6 to the middle of p. 8. Dr. Montagne refers in a note to the fact of his discovery of processes at the base of the threads of *Botrytis infestans*, resembling the suckers of the *Oidium*.

we consult the reports of the different commissions, and amongst them those of Victor Rendu to the Minister of Agriculture and Commerce, and Louis Leclerc to the Minister of the Interior, we shall find in almost every page new proofs confirmatory of the opinion of those who, like H. Mohl, consider the fungus as the essential cause of the evil, and very little to corroborate the contrary opinion, or which at least does not admit of some other mode of explanation. In the first of these reports, for instance, we read, "All other circumstances being equal, the disease has been more severe in those vines which were remarkable for their precocious or *vigorous* vegetation. . . . The young vines, laden with grapes, have been everywhere more severely attacked than the others (*V. Rendu Rapport*, p. 30). . . . Vines situated in the best soils, and the most vigorous are much the most diseased (l c., p. 56; and again p. 58 :) The most vigorous vines have been the most afflicted."

It should be observed that Victor Rendu does not profess any precise opinion, and that he relates faithfully what he has observed. Great stress may therefore be laid upon his facts, which, moreover, accord perfectly with those of Louis Leclerc, from whom I shall quote only the following passage:—"The vegetation of the vine, in the present year, with the exception of a very small number of vineyards, has been everywhere strong and vigorous, even in the places where it suffered most in 1851. The vine is everywhere, in the language of the workmen, *gaillarde*. Some persons, indeed, have discovered in this beauty and richness with which the tree is clothed, an aggravating circumstance and additional proof that its constitution is deeply impaired. I must avow that this passes the limits of my weak intellect, and that it is still impossible to admit that a plant is diseased for the very reason that it is in too excellent a state of health."

The arguments brought by the adherents of the other opinion are without weight; they are for the most part vague, or rest on that multitude of particular cases which in agriculture, as in medicine, prove absolutely nothing. And in relation to this subject I shall transcribe the following passage from Mohl's second memoir:—"Far less are the vines affected by a local malady; for, as is proved by the phenomena which I am about to relate, the fungus does not appear on parts of the plant already impaired by disease, but on the contrary on perfectly sound organs, and the disease of the tissues begins precisely at those spots to which the fungus adheres by special organs of attachment.

Here then the connection is so clear between cause and effect, between the agency of the fungus and the disease of the plants, that the opposite view, which is not confirmed by a single positive fact, appears to me to be flatly contradicted." Such are the expressions of Mohl. When I come to the question of the proper treatment and prevention of the malady, I shall have some new arguments to bring forward in support of this opinion.

Since it is abandoned now by everybody, even by some of the authors who first pronounced in its favour, I shall leave in the deep oblivion, from which it ought never to have been rescued, that opinion which would refer all the serious phenomena which attend the grape mildew to the presence of a species of *Acarus*.

The popular and absurd notion, again, can only be mentioned to be deplored, which ascribes the malady to the deleterious influence of street gas and the steam of locomotives. This foolish notion, participated by some who do not belong to the inferior ranks of society, is no less diffused in Italy than in many of our provinces.

I cannot, however, omit mentioning a theory proposed by M. Oudart, a clever and experienced cultivator of vines. It was presented by him to the Royal Agricultural Society of Turin, and it is to the report of M. Bertola that I am indebted for my knowledge. The author of this theory, resting on numerous observations made during a long tour through the vine districts, refers the cause to atmospheric changes and influences. He attributes the adherence of the *Oidium* to the berries, branches, and under-surface of the leaves to the exudation of a viscid moisture which commences by retaining the parasite, and as it hardens by obstructing the stomates and pores of the plant. The variations of temperature also play a prominent part in this theory, from which, if I mistake not, that which M. Guérin-Méneville has just propounded differs but slightly.

Oidium Tuckeri.*—The description and figures of the *Oidium* of the Vine have been so frequently reproduced that it seems useless to dwell longer upon it. Nevertheless, as neither Mr. Berkeley nor myself were acquainted with the important form of

* The vine mildew is now so well known by this name that there would be some inconvenience in changing it, even in order to adopt one more conformable to the ideas which have been recently propounded as to the real nature and position which this production ought to occupy in the system of Mycology. I shall continue then to use the name in preference to that of *Erysiphe Tuckeri*.

fructification discovered by Amici, when we described the species, it will be right to add a few words.

It appears that the organs which we had taken at first for spores, and which we found successively at the extremity of the erect threads of the Oidium, are merely a sort of buds which, germinating like true spores, are enabled in their absence to propagate the species. In fact, at the end of 1851, Amici found on gourds a form of fruit which was not even then * known in Erysiphe, where it has since been detected. This fruit, named Sporangium by Amici, Pycnidium by Tulasne, according to the different point of view in which they regard it, is formed in the joints of the necklaces of the fertile threads which swell, become yellow, assume a cellular structure, that is cease to be continuous and anhistous, and finally generate in their cavity many hundreds of exceedingly small ovoid slightly reniform spores presenting a little nucleus at either extremity. They have been observed to germinate. Baron Cesati, who has also detected them in Lombardy, thought that they authorised the creation of a new genus. In a recent letter, Mr. Berkeley informs me that he has detected them in grapes from Madeira.† Hitherto sporangia or pycnidia had been found only in the southern parts of Europe. Tulasne, however, in a recent communication to the Academy, informs us that he has detected them near Paris, where they had not been previously observed.

Even before the researches of Tulasne, an account of which must now be given to complete the history of the Oidium, this production had already received different names. M. Crocq,‡ although he confesses that he is not acquainted with Fries' *Systema Mycologica*, and had not seen any Oidium except that of the vine, regards it, nevertheless, on very insufficient and contestable grounds, for he had never seen the sporangia, as worthy to be raised to the rank of a genus under the name of Endogenium. Ehrenberg, to whom the fructification had been communicated by Amici, considered it the type of a new genus, and gave it the

* Dr. Plomley first detected it in the hop mildew in England almost at the same time. See *Gardeners' Chronicle*, 1851, p. 582.

† There is some mistake about this. A peculiar production was found in specimens of diseased grapes and vine-leaves from Madeira and the upper and lower Corgo, which has been figured under the name of *Coniosporium commilitans* in the last part of this journal, p. 58, fig. 9.—Tr.

‡ Memoir on the vine mildew which obtained the especial approbation of the Academy of Brussels, p. 15.

name of *Circinobolus Florentinus*, a genus, founded on the presence of the pycnidia, which did not differ from *Ampelomyces quisqualis*, instituted some time before by Cesati on the same character.* I participate in the opinion of Tulasne, who considers the genus *Byssocystis*, Riess (*Hedwigia*, 1853, p. 23, tab. III., fig. 2, d.) as belonging to this form of the fruit of *Oidium*. Finally I perceive from the report of Victor Rendu, that Dr. Castagne had proposed the name of *Leucostroma infestans* (not *Leucostoma* as erroneously printed); a sad instance of the injurious practice of overloading nomenclature with new synonyms which teach nothing.

In the course of last April, M. Tulasne published a memoir in the *Botanische Zeitung*, entitled *De Erysiphis animadversiones*, in which he recorded the result of his observations on the fruit of *Erysiphe*. The communication which he has just made to the Academy (Oct. 17, 1853) is a sort of recapitulation of that memoir with an especial reference to the vine mildew.

M. Tulasne considers *Oidium leucoconium*, *Erysiphoides*, *Tuckeri*, &c. as mere forms of fructification of the genus *Erysiphe*, of which there are occasionally three; 1, Acrogenous spores; 2, pyxidia, the fructification described by Amici; 3, peridia, or ascophorous fruit inclosing spores contained in transparent utricles known by the name of asci. Having established the presence of three kinds of organs of reproduction in certain species of *Erysiphe* he concluded that those which exhibit one or two only as *E. Martii* Léc., *communis* Fr., *lamprocarpa* Duby, are no less true members of the genus. And on these principles he includes, not without reason, our *Oidium* in the genus. If, as everything seems to show, M. Tulasne is right, should I not be correct, as I at first intended, in considering my genus *Capnodium*, which attacks the leaves of oranges and many other trees, as the most elevated form of *Antennaria* Lk. since it is ascophorous, and only differs from *Antennaria* as *Erysiphe* from *Ampelomyces*?

I may mention a matter here, which, though apparently foreign to the subject, seems to me to have some relation with those different forms which the fructification of one and the same fungal can assume; I mean that of *Eurotium lateritium* found on the garrison bread by Dr. Rayer, in the peridia of which I have detected asci containing spores, though this genus was previously

* He did not, however, perceive like Amici, that it was connected with *Oidium Tuckeri*.

considered as producing only naked spores. A German botanist (*Bot. Zeit.*, 1853, p. 134), who has either not read or forgotten my observation, has, after a lapse of four years, published this fact as new, though professedly passing in review all the writers who have spoken of Eurotium. The *Annales des Sciences Naturelles* is not, however, a publication of such obscurity as may justify a writer who has not consulted it. Some doubtless would have taken occasion to propose a new genus. We may therefore at least be thankful to him so far for his reserve.

A new question now arises; is *Oidium* or *Erysiphe Tuckeri*, by whichever name it may be known, really an autonomous species and distinct from its allied congeners, and especially from *O. Erysiphoides*, to which it comes the nearest; or is it merely a form or variety? The peculiar habitat which it has chosen, from which it has not migrated to surrounding plants, the observation of Mohl in his first memoir of an infected vine which did not communicate the disease to *Ampelopsis quinquefolia*, which was intertwined with it, and finally the fruitless attempts of Mohl and others to propagate it on other plants, lead to the belief that it is not a modification of some species already known, but a legitimate species in the sense applied to this word by botanists. But it may be asked, where was the *Oidium* before it attacked the vines? Is it a spontaneous production? To such questions I can only answer with Montaigne—*Que sais-je?*

As regards the first development of the parasite, or rather its invasion in spring, the opinion of Mohl, whom I quote in preference because he appears to have observed accurately, is that it first shows itself on the lowest internode of the new shoot. "On the branches the parasite occurs regularly on the lowest and oldest internodes; large spots covered with the fungus appear on these, and at a later period on the intermediate internodes, while the upper internodes (as is at present universally the case here) are altogether free. The fungus often spreads to the ovaries from the peduncles, which are already attacked before the blossoms expand, since the threads of the mycelium, a short time after the corolla falls, creep over the nectary and involve the berries, commencing at their base." I cannot quit this vexatious parasite without speaking of some experiments of which it has been the subject, and which have given occasion to certain strange and, as I believe, erroneous assertions. A botanist, known for many excellent works on other matters of Botany, has been induced by observation of the artificial germination of the acrogenous spores of the

Oidium to advance an opinion that this mould is capable of being transformed into four other fungals belonging to different tribes; viz., *Penicillium candidum*, *Trichothecium roseum*, *Alternaria tenuis*, and *Cladosporium Fumago*.

Without suggesting doubts as to the exactness of the facts observed, we may contest their interpretation. On points of such delicacy and difficulty, the best observers are subject to deception. It is not long since another distinguished observer, but not a mycologist, and mycology is a more difficult science than is frequently imagined, attempted experiments on an analogous subject, taking, as his point of departure, the curious observation of a mycelium found by M. Rayer in a hen's egg, the evolution of which gave rise to a new *Dactylium*; * experiments which led to consequences as singular, and to which it may be permitted to oppose, if not an absolute incredulity, at least a prudent degree of doubt.

In experiments of this kind, it is well to be assured that nothing is more difficult, or even, I might say, impossible, than to guard against every source of error. It is not as in experiments with higher plants, where one can see what one is about. We believe that we have sown a spore, where nature, without our knowledge or without its being possible to guard against it, has substituted one totally different.† In other cases the error arises from the fact that the spores of the different species which we imagine to proceed from one another, are propagated at the same time because they inhabit at the same time the same matrix. I cannot indeed indicate all the sources of error. It is not sufficiently remembered that the atmosphere is a vast receptacle where innumerable spores of every kind float together, mixed and invisible, and which wait only the peculiar circumstance necessary for their individual development.

Whatever one may do, or whatever precautions may be taken, we cannot avoid this substitution of one spore for another on which we wished to make experiment. If, therefore, with my own eyes I were witness to the extraordinary metamorphoses in question, far from giving them credit I should not even try to give an explanation. We have in fact arrived at a period when people wish at all risks to speak of themselves, and when simple observations do not satisfy the mind unless they are forced beyond

* Rayer, *Arch. de Méd. Comp.*, 1843, p. 175; and C. Robin, l. c. p. 543.

† See *Comptes Rendus*, Aug. 18, 1836. *Annales de la Soc. séricicole*, 1847. Robin, l. c. p. 560, 603.

their legitimate consequences as the ground of absurd hypotheses. Ought we not rather to be deeply impressed with those four words of the first aphorism of our common philosophic parent, "Experientia fallax, judicium difficile?"

I regret much that I feel compelled to say all I think, respecting these pretended metamorphoses. The question is not respecting those which a multitude of fungals undergo, in the different phases of their frequently ephemeral existence, and which make them so analogous, in this respect at least, to insects. But the fact is that botanists, in consequence of this natural propensity to estimate at a high rate their own works, and to despise those of others, have with a secret complacence rested on these more than hazardous assertions, in denying or impairing the solidity of the principles on which the distinction of genera and species is founded in mycology. In consequence, there is in their opinion nothing better to do with the mass of books, in which the principles of the Science are taught, than to burn them at once, for they have not the courage to master them. Is it possible, I would ask, to hear accusations so gratuitous and malevolent without reply?

A far more important object is to discover what becomes of the spores of the *Oidium* during winter, and on what part of the plant they sojourn till the following spring. The difficulty of such investigation will at once appear if we consider the smallness of the ovoid spore, and the still more extreme minuteness of those which are contained in the pycnidia.

Disposition to Disease.—I have exhausted what I had to say of *Oidium Tuckeri* considered as the cause of disease; I have still to speak of the greater and less disposition to disease of certain kinds of vine. The subject, however, is so extensive, and the materials so abundant, that I must confine myself to a mere summary. Those who desire more circumstantial details cannot do better than consult the important work just published by my friend and colleague, M. Bouchardat, in the *Supplement to the Memoirs of the Imperial Society of Agriculture* for 1852, which contains also a very exact chronological calendar of all the works hitherto published on the subject. The following information is taken from it:—

All other things being equal, the grapes which have the finest and most delicate skin, and the most succulent fruit, have been the most seriously affected, while those with a hard flesh and a thick resistant skin have been comparatively spared. At the

head of the first must be placed the Frankenthal, a variety frequently cultivated in our stoves, and which was the first nurse of the Oidium. Next in order are the different varieties of Chasselas, all the Muscats, but especially the white, the Malvoisies, the late white grapes, the Tressaux, most of the Hungarian grapes, the Hermitage, &c. The vines of trellises have also been affected sooner, more frequently, and more seriously than those which are kept low, and the vineyards in low moist situations than those of lofty hills.

The sorts which have offered the greatest resistance to the Oidium are unhappily those which are least esteemed; as, for instance, all the grapes of North America, the Teinturiers, the Cots of Touraine, the Gamays, the Servoniens, and the Melons. The Pinaux of Burgundy have for the most part suffered less than the others. The vines of Madeira have been so ravaged, that it is a question whether their cultivation shall not be abandoned for that of oranges, a notorious fact which must in no slight degree perplex those who attribute the disease principally to temperature or site.

It is evident that as regards the question of predisposition, I must confine myself to generalities, and these are subject to a host of exceptions, varying with time and place, the method of cultivation, and a thousand other circumstances of which it is right to take account when they admit of estimation.

Treatment.—We may divide the means of opposing the disease into two heads: 1. The means of prevention; 2. Those of curing and alleviating the malady when once established.

Prevention.—In the first rank must be placed beyond all doubt the layering of vines recommended by Bouchardat, who, however, is far from pretending that this method is infallible, though he has witnessed its good effects.

Another method which has some analogy with this, to the incontestable benefit of which I can myself bear testimony, consists in bringing down the branches or plants which it is desired to protect from Oidium to the naked soil, or better still on turf laid upon it. Dr. Robouam, who conceived the plan which he laid before the Academy on several occasions, especially Sept. 5, 1853, has derived considerable advantage from it. I have myself seen on his property at Montrouge plants the upper part of which was diseased and the grapes destroyed, while the branches which were brought down to the soil covered with turf, or gravel, or on stones bore numerous branches perfectly sound. One must not

imagine that this was exceptional or confined to a few feet; for in every part of his garden, which is of considerable extent, the branches resting on the ground presented the most beautiful appearance, as also the bunches which they bore.* Is not this a new argument in addition to a thousand others against the notion of a morbid alteration in the vine anterior to, or promotive of the invasion of the parasite? In truth, on this hypothesis how can we explain the facts which I have just related?

The following, observed last October at Beaumont Sur Oise is not less conclusive, viz., that of an espalier exposed entirely to the east, half of which was completely destroyed by the Oidium, while the other half in the most vigorous state of vegetation bore magnificent clusters. I pass on to certain practical methods recommended for the annihilation of the disease, viz., cutting down, incision at the foot of the stem, washing and rubbing the trunk, and finally cutting off the plant on a level with the soil.

According to M. Bouchardat the first is useless. The second recommended in Italy by M. Guida, of which the worthlessness was established in the very same locality, Dulgazo, by Victor Rendu, has not succeeded better, as reported by Louis Leclerc, in the hand of our cultivators.

Late pruning, according to Bouchardat, is preferable to autumnal pruning.

The washing the stems, especially with lime water, and friction are not to be despised in cultivation on a small scale. Baron Séguier communicated last July to the Agricultural Society a fact which had occurred to himself, and which comes in support of this practice.

As regards the cutting off the plants on a level with the ground, it has been tried in Hérault by M. Camille Cambon. Mohl, who has established its uselessness in Venice, and denounces it as showing the fatal influence which preconceived notions of the causes of the disease have had on the subject, speaks of it as follows:—"It is of immense practical importance to give currency to this view, since the proprietors fancied that they had a remedy against the disease in cutting the vines down to the ground, and the consequent renovation of the shoots, a process, however, which entailed a certain loss for some years."† This practice has

* This confirms the law established by M. Bouchardat. Other things being equal, the nearer the ground, the less subject is the vine to infection. M. Keller (*Il Bianco dei grappoli*, p. 17) has made the same observation at Padua.

† *Les Maladies des pommes de terre, des betteraves, des blés et des vignes*

been happily abandoned, in consequence of the wise counsel given above.

Remedial Measures.—We now come to the curative means employed to check the progress of the disease and to save the vintage, and shall state the measures which have proved most efficacious, referring to the excellent treatise by M. Payen and the works already quoted by Bouchardat.

One of the first means used successfully against the *Oidium* which had attacked the graperies at Margate in 1845 was a mixture of sulphur and lime, with which the diseased grapes were washed or sprinkled.

Since that period sulphur or combinations of sulphur have always held the first rank as capable of arresting the malady. Lime has also produced equally good results, but has sometimes failed. Other mineral and vegetable substances have also been employed successfully. Sulphuret of calcium has been recommended by M. Turrell; the marc of crude soda by M. Payen; sulphuret of calcium,* with the addition of an acid, that is, the magisterium of sulphur, by M. Becquerel; wood-ashes by M. Nadault de Buffa; hydrated sulphate of lime combined with nitrate of potash by M. Blain; protosulphate of iron by Messrs. Heuzé and Veza; and finally decoctions of *Euphorbia*, tobacco, walnut leaves, &c. I cannot enter into a full detail of the mode of applying these numerous agents, nor can I undertake to estimate their relative value. I shall, however, beg to say a few words on the most efficacious of them, viz., sulphur, whether in powder or in the form of solutions of its combinations. The following details are abridged from the works of Payen and Bouchardat:—

Flowers of Sulphur.—The leaves, branches, and shoots are first moistened as equally as possible with a syringe. Then by the aid of Gontier's fumigator the whole is dusted with sulphur, which adheres to the moistened surface. When the operation is carefully performed, says M. Payen, the success is certain, provided it be renewed if a too long interval before the approach of maturity and the dryness of the branches allow the greater part of the sulphur to be detached.

de 1845 à 1853, avec l'indication des meilleurs moyens à employer pour les combattre. Paris, 1853.

* Sulphuret of Potassium is mentioned afterwards as employed by M. Becquerel, but the chemical principle is the same in either case, the object being to produce a magisterium or fine impalpable precipitate of sulphur, which enters into every crevice or inequality.—TR.

This ingenious and economical process, especially applicable to vines cultivated in the stove or on trellises has also been attended with success in dwarfed plants. Leclerc mentions the example of a proprietor in Medoc who has employed Gontier's plan on a large scale; but it is Payen that informs us of its complete success, and that Count Duchâtel has found it equally beneficial in another vineyard of from 45 to 50 ares (1,224—1,235 acres).

Sulphuret of Calcium.—The employment of sulphuret of calcium by means of a syringe is due to Grison, a gardener at Versailles. M. Turrel tried it at Toulon on a vineyard of ten hectares (24,711 acres). It at first removed the evil as if by enchantment, but it would have been necessary to repeat the operation several times to ensure complete success because new spores of *Oidium* from neighbouring vineyards which had not been disinfected are apt to cause its reappearance.

Sulphuret of Potassium.—In a late session of the Imperial Society of Agriculture, M. Becquerel reported a method which he has found to answer well, which consists in washing the diseased bunches with a solution of sulphuret of potassium to which a small quantity of acid had been added in order to precipitate the sulphur, that is to say, with a magisterium of sulphur. He has by this simple method caused the sulphur to adhere to the fruit and to act efficaciously against the parasite.

Use of Diseased Grapes.—Are diseased grapes when used deleterious? Every observation tends to show their perfect harmlessness; and, besides, it is clear that not even a child would be tempted to eat the grapes infected to such a degree with the fungus as to remain as sour as verjuice. But is the wine made from diseased grapes harmless? The following is the answer to this question by the report of the commission of the Linnean Society of Bordeaux:—"The commission does not hesitate to affirm that the alarm too generally dispersed, and favoured by speculators, is without foundation, and that the injurious qualities of the grapes when they are made into wine do not give rise to very serious maladies." All that I have been able to collect on this subject is confirmatory of this declaration.

Prognostics.—The future prospects of the disease are beyond doubt an impenetrable mystery; for we have in the *Oidium* a formidable enemy, all whose habits are not at present perfectly known, and whose capabilities of dissemination are immense. Will it then be transitory, or is it likely for a long period to

ravage our vineyards? Such questions cannot be answered in a satisfactory manner. Nevertheless, as nothing violent is durable, it is probable that we shall be relieved in time. We should above all hope to see it cease or be modified, if one of those dry and severe winters, which are now so infrequent, should chance to destroy the seeds of the parasite. But should this not be the case, we must patiently submit, using every means of prevention which that divine Providence which is constantly at work has placed in our hands, and which cannot permit such a calamity to be perpetual and to press indefinitely upon one of the most useful conquests of human industry.

I firmly trust that such will be the case with this as with some other afflictions of which we have witnessed the alleviation, as also of some epidemics of which men and animals have been the victims at more or less distant epochs; I doubt not that it will gradually wear out. What has taken place in many localities, and especially this year in the environs of Paris, confirms us in the hope that it will halt in its march, and that we shall at last be relieved from the most terrible scourge which has ever affected the productions of our soil.

Though arrived at the end of my task, I am so far from having exhausted it that I have scarcely skimmed over the surface. I have been obliged to pass lightly over many questions which demand new researches. I have nevertheless thought that this summary, imperfect as it is, which has extended to a greater length than I imagined, will be sufficient to show, in its true light, the state of the agitating question which is debated under our eyes, the solution of which from its grave interest deserves our care, but which demands nothing less than the union of all our efforts, and the concurrence of every degree of light and intelligence.

PARIS, *November 25, 1853.*

XI.—ON STRUCTURES FOR HORTICULTURAL PURPOSES. By
R. Errington, C.M.H.S., Gardener to Sir Philip de
Malpas Grey Egerton, Bart., F.H.S., Oulton Park,
Tarporey, Cheshire.

(Communicated February 12th, 1854.)

It is really somewhat surprising, amidst the numerous changes which have been taking place in almost every thing connected with gardening affairs, that hothouses, greenhouses, and most of the other in-door appliances, awarded to the Gardener, in order to imitate brighter skies, remain very nearly as they did a score or more years since, as to the question of form. How is this? If correct, it would seem that the affair is what our printers call stereotyped. Sir Joseph Paxton was perhaps one of the first to show the public, that there was no absolute necessity in all cases to erect what have been termed "lean-to" structures; and that such, in many cases, were not only destitute of effect, but were indeed not particularly qualified to carry out the aims of those who erected them, in deference to mere prescription.

That the first general idea of forcing structures in Britain should be the "lean-to" was natural enough; glass was bad, and doubtless long before the modern Vinery or Pinery was in being, our "rude forefather" would, in trying to protect things of doubtful hardihood, or to accelerate, seize on a warm slope having a southern inclination; and moreover hoist occasionally a rugged covering, to ward off severe weather: this would be a kind of "lean-to."

Forty or fifty years since, when our glass was almost as opaque as the horn panes of a stable lanthorn, there was indeed every reason for lean-to structures; "burning" was almost unknown, and indeed every ray of the most intense sunshine was needed, and then fell far short of the needs of the vegetation within. But, surely with the production of fine crown glass, the whole question should have been reconsidered; and strange it is, that no one came forward bold enough to dare to give it a free handling apart from mere custom. When we take into consideration the continual recurrence as years roll on of "scorching," "blistering," "burning," and the various technicalities in gardening phraseology, expressive of injury through the intensity of the solar rays, the question of form may surely be considered an open one, and

moreover one of a most inviting character. One great fact should be had in view, in approaching this question; the fact that most of the injuries from intense sunlight occur from about eleven A.M. to two P.M.

Now span roofs, or any multiple of them; call them ridge and furrow or what we will, if running north and south, and consequently presenting morning and evening slopes, are just calculated to avert that evil; and not only that, but to present such advantages as at once to carry weight, whatever defects they may have. I have certainly known this burning, blistering, &c., occur at four or five in the afternoon, but then it has invariably been through bad management: the person in charge of the houses has closed them injudiciously, or your "stoke-hole-man" has been wasting his fuel.

It is really lamentable to see (as is no very uncommon thing with metallic structures) the gardener driven to shading, and not only that, but prevented closing his house, or at least reducing his air betimes in the afternoon, through dread of this scorching. And yet, such is at times the case, and thus that great maxim with the forcing gardeners of shutting in much solar heat betimes, both on principle and economy, is set at nought, and after perhaps extreme aridity with a shifting air, he is obliged to betake himself to extra fire heat in order to make sufficient progress; it is surely almost needless to say how much inferior in principle, as well as more costly, is the latter proceeding.

The great accumulation of heat, too, at the upper portion of the roof; how unnatural, how wasteful! It is scarcely too much to affirm that ten per cent of the fuel is wasted in this angle, especially in high houses with a smart incline. And then the old sliding upper sashes to let this unnecessary accumulation escape; how liable to cause expense! But, in a ridge and furrow running north and south, it may be presumed that in ordinary cases bold pediment ends, capable of being thrown open, together with ample provision at low levels for the ingress of fresh air, will generally suffice. I have, during the last four or five years, made a point of talking this subject over with really experienced gardeners, when I could fall in with them, and of inviting them to urge as many *real* difficulties as they could in the way of the north and south span roof; but I have never been able to collect opposing evidence worthy of grave consideration.

I therefore respectfully submit the question to the consideration of the readers of the Horticultural Society's Journal, and should

be most happy to see the pros and cons fairly grappled with by men of science and horticultural experience combined.

For my own part, I believe that before many years pass we shall have structures of this class exceedingly multiplied, and persons establishing new gardens on a bold and well-concerted plan, covering at once an extent of ground in a way that now might be thought chimerical.

There seems a growing desire for orchard houses ; in other words, a desire to *command* a crop of fruit, bidding defiance to all casualties. I believe this to be perfectly attainable, and if so a low and continuous ridge and furrow structure, being thrown over a considerable extent at once, will doubtless be made to form a system complete in itself, and highly conducive to the dignified appearance of fine gardens.

XII.—ON THE CULTIVATION OF HYACINTHS IN GLASSES.

By the Rev. W. B. Hawkins, F.H.S.

(Read at a Meeting of the Society, held March 21st, 1854.)

THE cultivation of Hyacinths in glasses is so universally practised, and affords so much amusement and gratification to persons who do not otherwise engage in floricultural pursuits, that perhaps a few remarks on a more easy and successful method of producing these very beautiful flowers may not be without interest to the Society.

I have, for several years past, raised these flowers in water-glasses in the manner usually adopted, namely, occasionally changing the temperature by removing the glasses from a cold room, when the weather became more severe, to an apartment with a fire, and at a more advanced period of growth, keeping the plants entirely in a warm room until the flowers fully develop themselves. I found, however, as many persons, I believe, experience, great difficulty in preventing the stem and the leaves from growing too high, and thus diminishing the size of the flower by diverting its proper nutriment, and also in preserving the stem of the plant in an upright position.

I determined, therefore, to try a different plan this last season, and, accordingly, after keeping the bulbs in water-glasses from

the middle of October until the latter part of November in a darkened room, in order that they might produce strong roots, after that period I retained them altogether in an apartment in which no fire was ever lighted, placed on a table close to a window. In this situation they remained without any other protection from the external air, even during the night, than the window, as the shutters were never closed, and a linen blind only was drawn down at night to mitigate the extreme cold. On four or five nights only, during the very severe weather of the past winter, when the snow was on the ground, were they removed from this situation, and then only to another table placed between the windows of the room, and at a distance of not more than three or four feet from either window. Notwithstanding, however, this very low temperature to which they were constantly exposed, each bulb produced a remarkably fine flower of considerable size, much larger, indeed, than those grown in what are usually considered the most favourable situations, and equalling in size many of those Hyacinths grown in pots, which have been exhibited at different times in the rooms of the Society. The stems and foliage also displayed a particularly healthy and vigorous appearance.

The bulbs which I selected for this experiment were some of the choicest sorts, which are more difficult to raise, and more capricious in their mode of flowering. When the great and unusual severity of the weather during the past winter is recollected, I think this experiment may be considered as affording a good proof that the Hyacinth is a much more hardy flower than is usually imagined, and that it does not want the species of hothouse culture and high temperature which are generally given to it.

What these flowers appear to require, is, as much light as possible, a tolerably pure atmosphere, occasional change of the water in the glasses, which should be effected not by merely filling up the glass, but by pouring off the whole of the water in each, and filling it up entirely with that which is fresh. A frequent change of position also is wanted, so that each part of the plant may be brought in turn to the light, which will not only render it more strong but more upright as well.

XIII.—HISTORICAL NOTES ON THE INTRODUCTION OF VARIOUS PLANTS INTO THE AGRICULTURE AND HORTICULTURE OF TUSCANY: a summary of a work entitled *Cenni storici sulla introduzione di varie piante nell'agricoltura ed orticoltura Toscana*. By Dr. Antonio Targioni-Tozzetti. Florence, 1850.

THE investigation of the origin and introduction of the vegetable productions raised for the use of man, is not only an interesting study in a critical, historical, or geographical point of view, but it may be applied to practical use by the cultivator. In showing how very few of these plants are to be met with naturally in the state in which we grow them, and how by careful and persevering cultivation, their natural properties have been modified, so as to suit the purposes they are applied to, a stimulus is given to our exertions in the still further improvement of those already known, as well as for the introduction and conversion of new species or varieties to the use of man. At the same time the knowledge of the readiness with which, in some instances, a worthless weed has been changed into a valuable esculent, and of the lengthened period which has at other times been required to effect the conversion, may often suggest to us the *modus operandi* to be attempted on future occasions.

But this enquiry is often attended with no small difficulty. However readily we may trace the process by which our European cabbages and carrots, or apples and pears, have been received into our gardens and orchards, and there made to produce the luxuriant vegetables and fruits of modern days; however authentic may be the records of the introduction of the tobacco, the potato, and other additions to our esculent, economical, or ornamental plants, since the discovery of America, and the invention of printing, it is a very different matter to trace with any great degree of plausibility the origin of the majority of the Cerealia and fruits of more ancient cultivation, and which still supply so important a part of our agricultural and horticultural productions. Tradition ascribes "the East" as the source from whence many of them sprung, and so much is this relied upon, that in all cases where a plant, known to have been cultivated in early ages, cannot now be found growing wild, there is a natural tendency to assign as its probable native station some unknown district among the mountains of Central Asia. It is indeed probable, that the populous herbivorous nations which early occupied the

warmer climates of that continent, had become cultivators for ages before the wilder and more carnivorous hordes which wandered over the colder regions of Europe, and that civilisation, as it spread from the former over the latter, carried with it the more useful Cerealia and fruits then known. But all were already in a state of cultivation, that is, more or less modified by human labour and skill. It seldom has occurred in modern days, still less is it likely to have happened in early ages, that a wild plant has been brought from a distant country to be grown in our own, for the use of man. The conversion must have been gradual, and generally, if not universally, in the district where the species was indigenous.

Wherever, therefore, the origin of a plant, cultivated in a given country, is involved in doubt, all enquiries tending to clear up that doubt must resolve into the following queries:—

1. When was it first known to have been there cultivated?
2. In what countries, if any, was it previously cultivated, and if so, when and how could it have been from thence transported?
3. What are the plants indigenous to the region where it was first made use of, which could have been the wild origin of the cultivated varieties?

The answers to the two first questions may be derived from actual record, or from collateral historical evidence. But in early ages agricultural and horticultural nomenclature was exceedingly vague, and the allusion to vegetable productions is often so slight in ancient works, that it requires very great critical acumen to form any plausible opinion as to the identity of the plants mentioned. The conclusions come to require moreover to be constantly checked by a judicious study as well of geographical botany and local floras, as of the general principles of vegetable physiology as applied to horticultural and agricultural metamorphosis; and these geographical and physiological studies can alone supply the answers to the third of our queries.

Professor Targioni-Tozzetti's work applies more especially to the two first questions; and he has bestowed great pains in the historical investigation of the more important species and varieties now cultivated in Italy, and more especially in Tuscany. He appears to have carefully consulted and critically examined all the works bearing upon the subject which he had within his reach, including the writings of the ancient Greeks and Romans, those of Italian naturalists from the fifteenth century down to our own day, and a considerable number of modern French.

English, and German books of reference. He does not appear, however, to have had access to all the works of Royle and others in our own country, which have thrown so much light on the botany of the Bible, and of the early Asiatic nations, nor yet to numerous memoirs on detached points, which have appeared in French and German Transactions and periodicals. He is thoroughly acquainted with the agricultural botany of his own country, but has necessarily but a slight knowledge of the actual floras of those Eastern regions which are supposed to have poured forth so many vegetable treasures. Whilst, therefore, he has in the present work collected a great mass of valuable historical information, which should be consulted by all who are engaged in these investigations, he has contributed comparatively little to the solution of our third question.

Following the order he has adopted, partly systematical partly economical, though scarcely definite enough to be called a method, the *Gramineæ* and especially the *Cerealîa*, as the most important, are the first treated of, although with less detail than some others. No conclusion is come to as to the real origin of our four staple species, *Wheat*, *Barley*, *Rye*, and *Oats*. They are all shown to have been amongst the earliest grains cultivated in Italy; it is admitted that none of the indications of stations where they have been supposed to have been indigenous are to be relied upon, yet it seems still to be presumed that these cultivated forms are distinct species, which still exist, or have existed, wild in some hitherto unknown regions, with the same characters which they exhibit in our fields. The recent investigations of Mr. Fabre, of Agde, as to the effect of cultivation upon *Egilops*, and the conclusions to be deduced from them, if accurate, appear to be unknown to him. Yet, however little the remarkable changes observed by Mr. Fabre may be credited by some, they bear so strongly upon the question, that, until refuted, they must be taken into account by all who would write on the subject.* We ourselves have no hesitation

* The various specimens of *Egilops* grown in the botanical garden of Avignon, where the late M. Requier had bestowed particular attention to the genus, showed modifications produced by culture which were many years since most puzzling to us as to the intermediates between *Egilops orata* and *Triticum sativum*. One great character relied upon as the strongest proof of the impossibility of their having a common origin, the articulation of the rachis in *Egilops*, has always a tendency to disappear by luxuriant cultivation, not only in the ears of the *Gramineæ*, but also in the pods of *Leguminosæ* and *Cruciferae*, and in other parts of various

in stating our conviction, as the result of all the most reliable evidence bearing upon the subject, that none of these *Cerealia* exist, or have existed, truly wild in their present state, but that all are cultivated varieties of species now growing in great abundance in Southern Europe or Western Asia. We believe that most, if not all, of our cultivated varieties of wheat originally sprung from one botanical species of *Ægilops* (*Æ. orata*), excepting the smaller spelts of southern Europe, which are modifications of *Ægilops caudata* and *Crithodium ægilopoides*; that our barley and oats now grow wild in Europe in the form of some one of the recognised species of *Hordeum* and *Avena* respectively, although data are still wanting to determine precisely which is in each case the true type, and how many of the forms described as species it should include; and that our rye is a South European and Asiatic plant chiefly from the neighbourhood of the Black Sea, the *Secale montanum* of Gussone and *S. fragile* of Bieberstein being varieties at least of the original botanical species.

The different *Millets* mentioned as cultivated in Tuscany belong to four botanical species, the *miglio* (*Panicum miliaceum*), the *panico* (*Setaria italica*), the *saggine in spiga* (*Penicillaria spicata*), and five varieties (or, according to some, species) of *saggine* proper, (*Sorghum*). Of these the *Panicum miliaceum* and the *Setaria* were already known to the ancient Romans from a very remote period; the black-seeded *Sorghum* is recorded as having been introduced from India in the time of Pliny; and the other varieties, as well as the *Penicillaria*, are of more recent introduction from India or from Africa. All four species appear to have supplied grain for food, in periods of very remote antiquity, in Egypt or India, where their wild prototypes must be sought for. The *Panicum miliaceum*, and some varieties of the *Penicillaria*, are but little altered from the original forms as still found in those countries. The *Setaria italica* is not unlikely to be a luxuriant cultivated form of the *S. glauca*, a most abundant weed in all warm countries. As to the cultivated *Sorghums*, most botanists distinguish several species, although none are to be found in a wild state, except perhaps those which have a more diffuse panicle with less crowded flowers, and which come the nearest to the more luxuriant specimens of the *Sorghum halepense*, which is

plants. The fact that wheat, cultivated as it is in all climates where it can be made to grow, will nowhere propagate itself as a weed of cultivation, is a further proof that it is in a state much altered from its original wild form.

very abundant wild in some parts of Southern Europe, and all over Africa and India. Indeed, we believe it to be the opinion of an eminent agrostologist who has shown the soundest judgment in the investigation of East Indian and other *Gramineæ*, an opinion in which we fully concur, that the described species of *Sorghum* are mostly, if not all, mere varieties of the *Sorghum halepense*, produced by extensive cultivation during a long series of ages.

Maize or *Indian Corn* (*Zea mays*) now so widely spread over the South of Europe, does not appear to have been introduced from America till near a century after the discovery of that continent, though mentioned as a valuable article of food in the West Indies by several travellers of the 16th century; it is shown to have been still unknown in Spain at the close of that period, and it was not until after the year 1610 that it found its way through Spain and Sicily into Italy. Professor Targioni-Tozzetti satisfactorily shows that all supposed mention of this grain by earlier writers before the discovery of America referred to other kinds of grain, though under some of the names since given to the Maize. We are not yet sufficiently acquainted with the American flora to ascertain, with any probability, what is the original indigenous form of this, apparently, the earliest cultivated American grain.

Rice was in the year 1400 still only known in Italy as an article of import from the East. Its cultivation was introduced into Piedmont and Lombardy in the end of the 15th or commencement of the 16th century, either directly from India by the Portuguese, or through Spain and Naples by the Spaniards. Some of the varieties now grown in India appear to be but little removed from their wild prototype.

The *Sugar-Cane* is merely alluded to because its cultivation was attempted in Tuscany in the 16th century, but found totally unsuited to the climate. Of Asiatic origin, where the wild type is not uncommon, it was carried to the West Indies, and thence introduced into Sicily in the time of the Saracens. It was also, perhaps, for a short time cultivated in Calabria, a point which has been much disputed, although of no importance, as no success attended the experiment if made.

Leguminous plants, either as forage or as pulse, cover a wide extent of the fields of Tuscany, and in the latter shape form a much greater proportion of the food of the inhabitants than in our own country. The introduction of most of the kinds into Italy

dates from a period of very remote antiquity, for Professor Targioni finds them mentioned by nearly all the ancient Greek and Latin writers on Georgics, and their origin is difficult to trace. Some of them, indeed, are but little altered from the wild forms not uncommon in Italy; but whether these be indigenous, or have become naturalised there in consequence of their cultivation, remains doubtful. Taking them in the order in which they are here mentioned: the *Pea* has been stated by several authors to be a native of Italy, and Professor Targioni admits this to be the case with the *field pea*, or *rubiglio* (*Pisum arvense*), but with most botanists, insists on the *garden-pea*, or *pisello* (*Pisum sativum*), being a distinct species of unknown origin. In this conclusion we cannot join; all our cultivated *Pisums* are surely referrible to one species, which is most probably really indigenous only in the more eastern of the districts, where it is now found apparently wild.

Of the *Haricots*, or *French beans*, *Fagioli* (*Phaseolæ*), only two are mentioned as grown in Tuscany, both indigenous to and introduced from East India, where the cultivated species are very numerous.* One is our common *Haricot*, or *French bean* (*Phaseolus vulgaris*), so well known in all civilised countries; the other is the *Fagiolo del Occhio* (*Dolichos melanophthalmus* of Savi), a mere variety of the *Dolichos* or *Vigna Sinensis*, much cultivated in India and Egypt, but only very sparingly so in Southern Europe, and entirely unknown in this country.

The common *Bean* (*Vicia Faba*), has been vainly sought for in a wild state. The vague indication of supposed habitats in Persia, or on the shores of the Caspian, have not been confirmed by modern researches. May it not, however, have had its origin in the *Vicia Narbonensis*? a species not uncommon in the Mediterranean region from Spain to the Caucasus, and very much resembling the Bean in every respect, except in the thinness of the pod and the smallness of the seeds.

* These, however, are not nearly so numerous as is generally supposed; thus, the *Phaseolus vulgaris* includes at least eight of the commonly adopted species of modern botanists, the *P. lunatus* four, the *P. Max* or *Mungo* (which is either dwarf or climbing, like the *P. vulgaris*) five or six, the *P. Truxillensis* three or four, *Dolichos* (or rather *Vigna*) *Sinensis* four or five, *Lathyrus vulgaris* at least as many, *Canavalia gladiata*, two or three, and so on. This multiplication of species has not been owing entirely to the considering as botanical species what are mere varieties of cultivation, but in several instances it has arisen from the same varieties having been received from Asia, Africa, and America, and separately described without advertent to their common origin.

The seven following are stated to be all spontaneous in Asia, and slightly improved by long cultivation in European fields, being all mentioned by ancient Greek and Roman writers, viz. : the *Lupin* (*Lupinus albus*), the *Mochi* (*Lathyrus cicer*, Pois cornu of the French), the *Cicerchie* (*Lathyrus sativus*, or Gesse of the French), the *Leri*, or *Zirli* (*Vicia ervilia*), the *Vetch* (*Vicia sativa*), the *Cece* (*Cicer arietinum*, or Pois chiche), and the *Lentil* (*Ervum Lens*). Several of these are now wild also in Italy, and the two *Lathyri*, and the common *Vetch*, may be indigenous ; but they may with equal probability be only naturalised, as they are evidently so little altered by cultivation, that they may readily propagate naturally when they meet with a genial soil and climate. All of these are more or less eaten by the Italians as pulse, but few would be palatable to the English tastes. The *Cicer* indeed, though rather coarse, is very fair when properly dressed and seasoned, but the only one really deserving importation is the *Lentil*, which is both wholesome and nutritious, and excellent *en purée*, in various stews and made dishes, &c. It is very much consumed all over Southern Europe, and constitutes, in all probability, that much puffed article, so absurdly disguised for the purpose of sale under the high-sounding name of *Revalenta arabica*, an evident corruption of *Erba lenta*.

Numerous as are the *Leguminosæ* used for forage in Southern Italy and Sicily, four only are mentioned as cultivated for that purpose in Tuscany : the *Lucern* (*Medicago sativa*), introduced, according to the ancient writers, from Media into Greece, in the time of Darius, and thence into Italy ; the *Sainfoin* (*Onobrychis sativa*), the *Sulla* or *Lupinella* (*Hedysarum coronarium*, or French honeysuckle), and the *Trafogliolo* (*Trifolium incarnatum*), the three last indigenous to Italy, and of comparatively modern cultivation. Allusion is made to the confusion and frequent interchange of names between the Lucern and the Sainfoin, which appears to be as prevalent in Italy as it is in many parts of France, and has often led to error in regard to their agricultural statistics. No mention is made of our common red or white clovers, nor of the *Medicago lupulina*, so much cultivated in Britain and Central Europe.

Four esculent *Solanææ* are extensively cultivated in Tuscany : the *Potato*, the *Tomato*, the *Egg-plant*, and the *Capsicum*, the two first of American origin, the third East Indian, and the fourth either American or African, or both.

The history of the introduction of the *Pomato* (*Solanum tube*

rosum), is well known. Although mentioned occasionally by American explorers of the 16th century (by some confounded with the *sweet potato*, a convolvulaceous plant), it was not otherwise known in Europe till brought to England by Sir Walter Raleigh in 1586. Two years afterwards, Clusius at Vienna obtained two tubers through the Prefect of Mons, in Belgium, from a servant of the Pontifical Nuntiate in the Low Countries. It may have been transmitted to Italy at about the same time from the same source. At any rate, it was certainly in cultivation in Tuscany at the commencement of the 17th century, for Father Magazzini of Valombrosa, in a work on Tuscan agriculture, published in 1623, after his death, gives directions as to its cultivation, which he alludes to as being then habitual, having been introduced from Spain and Portugal by the barefooted Carmelite monks.

Professor Targioni, led into error by the insertion of the *Tomato* (*Solanum Lycopersicum*), in the first floras of Cochinchina and Amboyna, considers it as a native of India, as well as of Peru, and expresses, therefore, some surprise that it should have been unknown to the ancients. But, if ever found wild in the Eastern Archipelago, it is only as spread from cultivation, for it is now ascertained to be exclusively of Peruvian origin, and was not known in Europe until after the discovery of America. It appears, however, to have preceded the more useful maize and potato, for Matthioli mentions its introduction in his days, that is, in the commencement of the 16th century. It was first cultivated rather for ornament than for food, which may, perhaps, explain its more rapid introduction.

The *Melanzane* or *Petonciani* (*Solanum Melongena*, Aubergine of the French, the Egg-plant * or Bringall of the West Indies) is most probably a native of Asia or Africa, although the precise original indigenous form has not as yet been satisfactorily made out. Many of the supposed botanical species of the most recent monographist are mere cultivated varieties, and their connection with allied forms stated to be wild in India or in America requires much critical investigation. Its cultivation in Italy cannot have been extensive before the discovery of America. It is indeed generally supposed to be referred to by Theophrastus

* This name is generally given in our gardens to the short white-fruited variety which we grow merely as an object of curiosity. It is the long purple-fruited variety that is so much cultivated in the South as an article of food.

under the name of *Strychnos*, by Avicenna under that of *Bedangian*, and especially by St. Hildegarda, Abbess of Bingen, who died in 1180, under that of *Megilana*, yet the identity is in no case placed beyond doubt, and requires collateral proof to be derived from the botanical and geographical investigation of the original wild type of the species.

There is still greater uncertainty as to the real native country of the *Capsicum* or *Hot-pepper* (*Capsicum annum*, Peperoni of the Italians, Piment of the French), now so universally spread over all tropical countries. Although long known under the name of *Indian Pepper*, it appears not to be indigenous in Asia, and there is no authentic record of its cultivation in Europe before the discovery of America. It is said to be really wild in that continent, and Cæsalpin and Clusius, late in the 16th century, both speak of it as introduced from thence. Yet, in the time of Matthioli, early in the same century, and consequently, at a period when very little of the natural productions of the New World had been transplanted to the Old, we find at least three varieties well established and abundantly cultivated in Italy under the name of Indian pepper, which is hardly probable if it had been really introduced from America, then so recently discovered.

A curious instance of the slowness with which the use of culinary vegetables is spread, is afforded by the large green mild variety of *Capsicum*, which is so much eaten over a great part of Spain and some of the adjoining French departments. It was carried by the Spaniards into Naples during their dominion in the 16th and 17th centuries, and has ever since remained in common use there without spreading further. In Tuscany it is scarcely known, except as an object of curiosity in botanical gardens. It makes an excellent salad, having all the flavour of the capsicum without the slightest pungency.

The cultivation of the *Sweet potato* or *Batata* (*Ipomœa Batatas* or *Batatas edulis*) has been at various times attempted in different parts of Italy, but as yet without success, notwithstanding the strongest and repeated recommendations of its importance. In a wild state, it is one of those maritime plants which is spread over the shores of both the New and the Old World, within or near the tropics, but its cultivation appears to have originated with the Americans. It was evidently unknown to the ancients, and the first mention of it on record is by Pigafetta, who found it used as an article of food in Brazil, where

he landed in 1519. Its first introduction into Europe was probably by Oviedo, after whose return to Spain, in 1526, it was cultivated at Malaga, and from thence sent out to different parts of Europe. Clusius purchased some fresh roots in London in 1581, to carry with him to Vienna. Since then, various attempts to turn the Batata to account, have been made in Tuscany, in Lombardy, at Rome, and in other parts of Italy; but have all failed, either from the ungenial climate or still more from the difficulty of preserving the roots through the winter. The Marchese Ridolfi is said more recently to have discovered a mode of treatment, by which these obstacles may be in a great measure removed, and to have given an account of it in the Acts of the Academy of Georgofili of Florence. Yet the cultivation of the root is certainly not yet carried to any extent in Italy.

In his note on the *Jerusalem artichoke* (*Helianthus tuberosus*) Professor Targioni repeats the common tale of its being of Brazilian origin and deriving its French name of *Topinambour* from that of the tribe of Indians occupying the district of which it is supposed to be a native. But this assertion, copied by one writer after another, appears to rest solely on a dictum of Clusius, and certainly no traveller in the land of the Topinambas has found anything approaching to it in botanical affinity or in physiological constitution. It is a hardy plant, introduced into Europe from the more temperate regions of North America, and it is amongst the *Helianthi* of that continent, and more especially of the Mexican dominions, that its wild prototype must be sought for. It was carried from France into Tuscany in the end of the 16th or the commencement of the 17th centuries, and is now sparingly cultivated there under the name of *tartufi di canna*, or *cane truffles*.

The *Artichoke* (*Cynara Scolymus*) is a mere cultivated variety of the *Cardoon* (*Cynara Cardunculus*), of which the still more reduced wild form is common over Southern Europe and a portion of Central Asia. What part of this wide district may have been its original native country cannot well be now ascertained; for, like all thistles, it spreads with remarkable facility wherever it finds a genial soil. Carried out from Europe to the gardens of Buenos Ayres, and escaped from them over the country, it is said to constitute that gigantic thistle of the Pampas so feelingly described by Sir Francis Head: To the ancient Romans it was only known in the shape of the Cardoon, cultivated as a culinary

vegetable, the part eaten being the petioles of the leaves. In Italy the first record of the artichoke cultivated for the sake of the head, or rather the receptacle of the flower, was at Naples, in the beginning or middle of the 15th century. It was thence carried to Florence, in 1466; and at Venice, Ermolao Barbaro, who died as late as 1493, only knew of a single plant grown as a novelty in a private garden, although it soon after became a staple article of food over a great part of the Peninsula.

Lettuces, *Chicory* and *Endive*, appear all to have been in cultivation ever since the times of the ancient Greeks and Romans, without any record of their first introduction. The numerous varieties of the *Lettuce* have been referred by modern botanists to three supposed species, (*Lactuca sativa*, *L. capitata*, and *L. crispa*), and, as no plants so characterised are now to be found wild in our own quarter of the globe, their origin is vaguely assigned, as usual, to East India. That country may, however, be well ransacked before cabbage- or cos-lettuces are met with growing wild in the mountains. Their prototypes may be sought for with much better chance of success amongst the common wild *Lactucæ* of the Mediterranean region, but can only be determined with any degree of probability by a more correct knowledge of the changes produced by luxuriant cultivation on their foliage than we now possess. The cultivated *Chicory* is universally acknowledged to be but a slightly altered variety of the wild plant (*Cichorium intybus*) so common over a great part of Europe; the *Endive*, on the contrary, is always enumerated as a distinct species (*Cichorium endivia*) of unknown origin, unless it be "East India." We fear it must share the fate of the Lettuces, be erased from the list of botanical species, and reduced to the rank of a cultivated variety of the *Chicory*.

Umbelliferae abound in the hot regions which surround the Mediterranean, and the strong flavour which pervades every part of many species has brought several of them into use in very early ages, either as condiments, or as articles of food. Some of them, either from inattention, or from not being considered of sufficient value to cultivate, have remained unaltered, and their use has not been extended beyond the limited circles in which they are found wild, whilst in others man has succeeded in producing such a development of the tap-root, or of the lower part of the stem and leaves, with a corresponding softening down of the asperity of the flavour, as to supply excellent culinary

vegetables. Hence the *Carrot* (*Daucus Carota*), the *Parsnip* (*Pastinaca sativa*), and the *Celery* (*Apium graveolens*), in universal use among European races, and the *Finocchio* (*Anethum fœniculum*), more especially appreciated in the Italian peninsula. All of these are indigenous to Southern Europe, and are now found in a wild state in most countries colonised by European races.

Professor Targioni's researches convince him that the *Carrot* and *Parsnip* were both known to, and cultivated by, the ancient Greeks and Romans; but that, until the middle ages, as far as can be traced from the vague descriptions of early writers, the parsnip was very much more general than the carrot, although since then the proportions have been everywhere reversed. The carrot, indeed, appears much more susceptible of improvement under the enlightened cultivation of modern days, and the readers of our "Horticultural Transactions" will recollect, in the second volume of the second series, a paper of Vilmorin-Andrieux's, in which he gives an account of the manner in which he succeeded, in the course of a very few years, in converting the thin, wiry, useless white roots of the wild carrot into a crop of fine, well-shaped, rich-coloured roots, equal to our best garden varieties; whilst in the case of the parsnip he has, we believe, never yet succeeded in effecting any perceptible change.

Celery was known to the ancients, but was considered rather as a funereal or ill-omened plant than as an article of food. By early modern writers it is mentioned only as a medicinal plant. Even as late as the 16th century it is spoken of as such by Alamanni, who praises at the same time the *Maceroni* (*Smyrnum Olusatrum*) for its sweet roots as an article of food. It is certain, however, that celery was already begun to be grown for the table in Tuscany at about the same time, and has now entirely superseded the *Maceroni* which was once much cultivated in Italian gardens in a similar way.

The *Finocchio*, so highly prized by the Italians, especially in the southern portion of the peninsula, is comparatively a modern vegetable. It has however produced several marked races or permanent varieties, amongst which the principal are the *finocchio forte*, but little removed from the common wild fennel, the *finocchio dolce* or sweet fennel, and the *finocchio di Bologna* or *finocchione*, with the lower part of the stem (or *head*) much enlarged and succulent. These three varieties are considered by modern Italian botanists as so many distinct species, the two last

stated to be of unknown but probably of "Grecian or Syrian" origin. But Professor Targioni admits that they are not mentioned by any Greek writers, and that the finocchio di Bologna was a new vegetable brought to Florence from Bologna in the middle of the sixteenth century. They are surely all cultivated varieties or races of the common fennel, which is truly wild in most parts of Mediterranean Europe.

Four other Umbelliferæ are cultivated in Tuscany as condiments. *Parsley* (*Apium Petroselinum*), a native of Southern Europe as well as of other countries, was cultivated for its leaves by the ancient Greeks and Romans, and has maintained its ground with little alteration to the present day. *Aniseed* (*Pimpinella Anisum*), now much grown in Tuscany, appears to have been formerly imported as an article of trade from Crete and Egypt, where it is indigenous. The first mention of its culture in Italy is by Palladius under the Roman empire. *Dillseed* (*Anethum graveolens*) and *Coriander* (*Coriandrum sativum*), natives of Southern and Eastern Europe, are also cultivated in Tuscany for their seeds, but are little appreciated in Western Europe. The *Caraway* (*Carum Carvi*), though as common in a wild state in Italy as in other parts of Europe, is not mentioned among Tuscan products.

The *Crucifera*, notwithstanding their importance in culinary and rural economy, are dismissed in a few words, the *Cabbage*, the *Turnip*, the *Rapeseed*, and the *Radish* being the only ones mentioned. The *Cabbage* (*Brassica oleracea*), which in some Northern countries constitutes a principal item in the food of the peasantry, is almost lost among the variety of culinary vegetables of the more favoured South. It is indigenous to the rocky shores of the Mediterranean and Black Seas, and has been brought into cultivation from the remotest ages. There is perhaps no species of vegetable which sports so readily, and of which a greater number of more or less permanent races and varieties have been established in our gardens. For a detailed account of the most important of them, the reader is referred by Targioni to De Candolle's well known dissertation.

The *Turnip* (*Brassica napus*) is still less appreciated in Italy ; indeed the climate appears to be scarcely suitable for its extensive agricultural cultivation, and in southern gardens it turns out a hard fibrous strong-tasting root, which we cannot blame them for neglecting. In its wild state it is so widely spread a weed, that it is impossible to say from data as yet recorded, what is its

original country. The *Rapeseed* or *Colza* (*Brassica rapa*), cultivated for the oil extracted from its seed, is mentioned by Columella and Martial. It is probably of a similar origin, and is indeed by some supposed to be a mere variety of the same species.

Radishes (*Raphanus sativus*) find in the South and East, climates much more genial to their constitution than with us, and the roots acquire a large size, red, white or black (although we have never seen any of those yard-long black radishes mentioned as having been exhibited at Moscow), but the flavour is seldom so mild and delicate as in our gardens. Both the long and the turnip-rooted were known to the ancient Romans, and Professor Targioni, reading in botanical works that *Raphanus sativus* is a native of China, appears somewhat puzzled to imagine in what remote times it could have been imported from thence to Rome. The fact is, there are no more wild succulent-rooted radishes in China than elsewhere, and any one who observes with an unprejudiced eye the varieties of shapes assumed by the pod of the *R. raphanistrum* on the shores of the Mediterranean, can scarcely fail to come to the conclusion, that he sees in that species the wild prototype of our garden radish.

The innumerable varieties of *Cucurbitaceæ* cultivated in Tuscany, are reducible for the most part to five botanical species, the *Gourd* or *Pumpkin* (*Cucurbita Pepo*), the *Bottle-Gourd* (*Cucurbita lagenaria*), the *Water-Melon* (*Cucumis Citrullus*), the *Cucumber* (*Cucumis sativa*), and the *Melon* (*Cucumis Melo*). They are none of them indigenous in Europe, but were all introduced in very early times from Asia or Africa. They all, as well as some other species not known in Europe, have from time immemorial been cultivated all over the warmer parts of Asia, yet some of them are positively stated never to be found there wild. Very little however is as yet known on the subject, for sufficient care has not been taken to investigate how far the characteristic forms are due to cultivation, nor to distinguish the real botanical species, so as fairly to compare them with the wild ones. We have no data at present for discussing the question, which can only be satisfactorily resolved when taken up by some intelligent Indian botanist, who will not rest satisfied with the validity of a botanical species till he has traced it to its really wild form.

The first introduction into use of *Alliaceons bulbs* is lost in the remotest ages of antiquity. They were cultivated as objects of adoration by the ancient Egyptians. The Greeks had many varieties, of which several are recorded by Theophrastus under

names derived from the Asiatic towns whence they were introduced, and they were also in common use among the Romans. Of the five species mentioned as now grown in Tuscany, the *Chires* (*Allium schœnoprasum*), a common European plant, already cultivated in the time of Theophrastus, is the only one admitted to be indigenous, but the *Leek* (*Allium porrum*) is evidently a mere variety of the *Allium ampeloprasum*, which also ranges over a great part of Europe. The *Shallot* (*Allium ascalonicum*) was very early introduced from Syria or Asia Minor, where it is still found wild. The *Onion* (*Allium cepa* *) will probably prove identical with the *Allium fistulosum*, a species having a rather extended range in the mountains of South Russia, and whose south-western limits are as yet unascertained. The *Garlic* (*Allium sativum*), including the *Rocambole* (*Allium ophioscorodon*), which is a mere variety, is indicated in several South Mediterranean floras, but in some instances the evidence of its being really wild is far from satisfactory.

The cultivated *Beets* are referred by Italian botanists to two species, of which one only, *Beta cicla*, is admitted to be of native origin, whilst the true *Beta vulgaris* is stated to be indigenous to Central Asia, Egypt, and the shores of the Mediterranean, to the exclusion of Italy. Moquin-Tandon has, however, more correctly reunited the whole under the Linnean name of *Beta vulgaris*, of which he reduces the numerous forms to three principal races : First, the *Wild Beet*, with a slender, hard root, sparingly introduced into kitchen-gardens for the foliage, occasionally cooked with sorrel to diminish the acidity of the latter. Second, the *White Beet*, *poirée* or *poirée-carde* of the French, with a thicker, but still hard root, with enlarged leaves and a great tendency to succulence in the petioles, which are blanched like cardoons for culinary purposes. This vegetable is frequently mentioned by ancient Greek and Roman writers. Third, the *beet-root*, *barbabietola* of Italian gardens, *betterave* of the French, so well known for its sweet and succulent root, was first introduced into Italy in the sixteenth century, from Germany, where it was probably first produced. A sub-variety of the beet-root, with a somewhat coarser and larger root, now become so important an article in agriculture, was originally put forward under the name of *root of scarcity*, *racine de disette* in French, or *mangel wurzel* in German,

* The supposed principal botanical character, the dilatation and lateral tooth of three of the filaments, is often ill-defined or disappears altogether in our garden onions.

which latter translation is now adopted by our farmers, absurdly corrupted into *mangold wurzel*.

Spinage (*Spinacia oleracea*) was unknown to the ancient Greeks and Romans, but appears to have been early used by the Arabs, transferred to their gardens from the plains and lower hills of Western Asia, where it is now found wild. The Moors carried it with them into Spain, from whence it gradually spread, in the middle ages, over the rest of Europe. It has now generally replaced the *Orache* (*Atriplex hortensis*), a plant also of Eastern origin, but of much earlier introduction, as it appears to have been known to the ancient Greeks under the name of *Atraphaxis*, and to the Romans under that of *Atriplex*.

Asparagus (*A. officinalis*), indigenous to Italy, as well as other parts of Europe, is mentioned both by Cato and Pliny as carefully cultivated, and attaining a considerable thickness in their days, and has ever been a favourite vegetable among the Italians, who grow it to great perfection; they likewise eat the thin, almost thread-like shoots of the wild plant.

Among sweet herbs, *Basil* (*Ocimum basilicum*) has been much grown, as a condiment or for medicinal purposes, in all hot countries from the very earliest times on record. It is an annual that sows itself so abundantly over the warmer regions of Asia and Africa, that it is impossible to say which may have been its original native country. Numerous varieties are recorded as produced by cultivation, and some other species are grown in India and Africa, but the common *O. basilicum* (which I am now convinced should include the *O. minus*) is the only botanical species known in Italy, where several varieties are great favourites in the cottage windows of the lower orders. *Sweet Marjoram* (*Origanum Majorana*) was introduced by the ancient Romans from Egypt or Syria, where it is still common in a wild state. *Tarragon* (*Artemisia dracunculus*), widely spread over South Russia, was brought, probably from the shores of the Black Sea, in more recent times. The first mention on record is by Simon Seth, in the middle of the twelfth century, but it appears to have been scarcely known as a condiment till the sixteenth century.

Among textile plants, *Flax* (*Linum usitatissimum*) was extensively cultivated and used by the ancient Egyptians, and formed a considerable article of trade between them and the Greeks, who, besides weaving its fibres, were acquainted with the medicinal properties of its seeds, which they even mixed with their bread. It was cultivated in Italy by the Etruscan Falisci in the

time of Silius Italicus, but was thought little of by the early Romans, who wore chiefly woollen clothing, till the time of the Empire, and even then its cultivation was not much favoured, in the belief that it exhausted the soil. In modern Italy it has been more generally grown, but still rather for local consumption than for exportation.

With regard to the origin of the species there is still considerable doubt. Professor Targioni follows other botanists in considering it as a common European plant; and it certainly is found wild in most countries where it is or has been cultivated; but all the evidence we possess tends to show that (with the characters assigned to the species by botanists) it is everywhere rather escaped from cultivation than really wild. Planchon, the last monographist of the genus, divides it into two species, neither of them known in their original indigenous stations. The species nearest allied, *L. angustifolium*, is indeed a common European one; but, amongst other characters, the differences in the size and colour of the petals, generally constant among Linums, prevent our pronouncing for their identity without further evidence.

Hemp (*Cannabis sativa*) is of East Indian origin. It is common in the hills and mountains of Northern India, and was very early cultivated throughout the East, though more for its intoxicating properties than for the fibre. Herodotus mentions it as grown by the Scythians, Dioscorides alludes to the strength of the ropes made from its fibre, and Galen to its medicinal properties. It was introduced into Italy by the Romans, apparently under the Empire, and much later than flax. It is now an object of very extensive culture in the plains of Lombardy, and in the Romagna.

Cotton (*Gossypium*) was imported from India by the ancient Egyptians, by the Greeks, and by the Romans, but appears never to have been cultivated in Europe till the Moors introduced it into Spain towards the twelfth century, although some assert that it was already grown in Sicily in the eleventh century. From Spain it was carried to Southern Italy, where there was much of it in the time of Porta, who died in 1515. Its culture is still kept up in Calabria and about Naples, and under Napoleon's continental regime it was in some measure profitable, but is now of no importance. In Tuscany it has been repeatedly tried, but as often abandoned, the crop being in that climate far too uncertain to afford any chances of profit.

Among *tinctorial plants*, *Woad* (*Isatis tinctoria*), much culti-

vated in early days for its blue dye, has now been generally replaced by the importation of indigo, excepting some partial use as a foundation for the darker colours. It was well known to the ancients, for its use for dyeing wool is spoken of as habitual by Dioscorides, Vitruvius, Pliny, and Galen; and the ancient Britons, according to Cæsar, and the Dacians and Sarmatians, according to Pomponius Mela and Pliny, were in the habit of colouring their bodies with it. Ancient authors distinguished the wild and the cultivated woad, but the former was probably some very different plant, and they, perhaps, only knew the real one in a state of cultivation. It was certainly grown in Spain before the twelfth century, and extensively so in Tuscany during the flourishing times of the wool-trade, in the thirteenth and fourteenth centuries, and up to the sixteenth. After that, however, it gradually diminished, as indigo came to be imported from America. To stop this decay, protective regulations prohibiting the importation of indigo were enacted in the Roman states in 1652, but they had but little success in the encouragement of the woad-growers; even Napoleon's continental system gave them but a short temporary stimulus, and they have now quite disappeared from central Italy. As a wild plant the woad has an extensive range over Europe and the temperate parts of Asia, but in the former continent it is probably only really indigenous in the southern and eastern districts. In England, at least, it is only to be found wild where it has escaped from cultivation.

Madder (*Rubia tinctoria*), furnishing the well-known beautiful scarlet dye, is another among the earliest cultivated for tinctorial purposes. Two sorts were known in the days of Dioscorides, and are still distinguished by botanists, but whether they be really species or races which have acquired a certain degree of permanency by long cultivation remains to be ascertained. The one, the cultivated *Rubia tinctoria*, with a thick succulent intensely coloured root, and annual stems and leaves, is said to be of Eastern origin, and is only found in Europe where escaped from cultivation; the other, the *Rubia peregrina*, is common in a wild state in the south of Europe. Its leaves and stems are of longer duration, and the root is much smaller and paler coloured, but is occasionally collected for the dyer even in the present day. In Tuscany, the cultivation of the more valuable *R. tinctoria* has been frequently attempted, but generally abandoned as not sufficiently profitable, owing either to unfavourable local circumstances, or to bad management, the dyer importing it from the Levant at

a very low rate. The Marquis Cosimo Ridolfi, however, whose name is so frequently mentioned in these pages in connection with the improvement and extension of the agriculture of his country, appears recently to have met with better success in the establishment of the growth of madder in the neighbourhood of Spoleto.

Safflower (*Carthamus tinctorius*), much cultivated in some parts of Italy, especially in the Romagna, some two or three centuries back, when first it came to be generally used for dyeing silk, is now much neglected there, for it is found that that which is imported from Spain or from East India yields a richer colour; and even that from the Levant and from Egypt, although considered as inferior to the Indian and Spanish, is still superior to the Italian. The plant was probably unknown to the ancient Romans, but Theophrastus, Dioscorides, and many other Greek authors mention it under the name of *Cnecon* or *Cnicon*. It was not then grown as a tinctorial plant, but for the medicinal properties of its seeds, and the flowers were only used as a condiment. The exact period of its introduction into Italy is doubtful. Pegoletti in the fourteenth century speaks of it as an article of importation only for the use of the dyers; Matthioli, in the sixteenth, mentions its cultivation, although he alludes only to its medicinal, not to its tinctorial, properties. One of the popular names quoted by Targioni, that of *Saracenic saffron*, would seem to indicate that the Italians had it from the Moors, probably during their dominion in Sicily.

The native country of the safflower is involved in great obscurity. East India is given by Professor Targioni on the authority of systematic botanical works, but we learn from the Indian botanists of the present day that it is there only known in cultivation, and that in the cold season, a circumstance showing clearly that it is not an indigenous plant brought into cultivation, but an importation from a different climate. It may possibly prove to be of African origin, if we may judge from the Abyssinian specimens distributed as indigenous among Schimper's collection. These specimens have much more spinous involucre than the variety commonly cultivated, and, in other respects, seem to show, at any rate, a nearer approach to a wild state.

Saffron (*Crocus sativus*) is a native of Italy, as well as of many other parts of Europe and of the Levant, and has long been cultivated for the odour and flavour, as well as in more modern days for the tinctorial properties, of the styles. It is mentioned

by many ancient writers, and was certainly cultivated in Southern Italy and Sicily as far back as the time of Pliny. It was also extensively and profitably grown in Tuscany in the fourteenth and fifteenth centuries, when it was made the subject of many fiscal and protective regulations, but it is now entirely neglected as being imported at much less cost and of better quality from Southern Italy, Spain, Barbary and Greece, and even from Orange in France. Besides its consumption by dyers it is much used for colouring Parmesan cheese and several kinds of Italian paste for soups.

Yellow Wood, Weld, or Dyer's-weed (*Reseda luteola*) is another tinctorial plant indigenous to Europe. The ancient Romans made use of the wild plant only, but in more modern times it has been made to produce a much finer dye by cultivation, which appears in Tuscany to have commenced in the flourishing days of the wool-trade. In the sixteenth century it was very general, and, like saffron, the subject of numerous fiscal and protective ordinances. It still continues to form an article in the agricultural produce of the Cortona district.

Dutisca cannabina, an oriental plant, first discovered in Crete in 1594, has, in our own days, and especially by Braconnot in 1816, been shown to produce a very fine and permanent yellow dye, and to be well adapted for growth in the climate of Tuscany. Prof. Targioni refers on this occasion to several other papers in which he has strongly recommended its extended cultivation, especially in the Maremma, but it does not appear how far his recommendations have been practically adopted.

The cultivation of the *Poppy* (*Papaver somniferum*) dates from the most remote ages. It varies considerably in the colour and size of the flower, in the form of the capsule, in the colour of the seeds, etc.; but all these varieties constitute a single species, which is found abundantly in a wild state in South-eastern Europe, and in the Levant. In many cases it may indeed have escaped from cultivation, but there is every reason to believe that, in a great part of the East Mediterranean region, it is a truly indigenous plant. That the ancient inhabitants of Italy were aware of its narcotic properties is proved by the frequent allusions in the verses of Virgil, Horace, Ovid, and other Roman poets; we learn from Pliny that poppies were cultivated and held in high estimation in his time, and Livy's story of the answer given by Tarquinius Superbus to his son's envoy, by cutting off the heads of the poppies of his garden, would carry us back to a much

earlier date In Tuscany, at the present time, poppies are extensively sown for medicinal purposes, for the extraction of oil from the seeds for the use of artists, and also when olive oil is scarce to supply its place as a condiment, or for burning, or making soap, &c. Its seeds are also eaten, but the climate is not hot enough to grow it for the extraction of opium.

There is no plant, observes Prof. Targioni, whose history shows so many vicissitudes as that of the *Tobacco* (*Nicotiana tabacum*). Imported from America soon after the discovery of that continent, it was received into the old world with a species of enthusiasm, and Europeans, Asiatics, and Africans began everywhere to smoke, to chew, and to snuff. It was not long, however, before some of the evils and inconveniences involved in the practice began to appear, and a host of enemies were raised up against it. Theologists pronounced it an invention of Satan which destroyed the efficacy of fasting, a point much disputed in the sixteenth and seventeenth centuries. Councils forbade it to all ecclesiastics under their control. Popes Urban VIII. and Innocent XI. punished the use of it with excommunication; Sultan Amurat IV. with the most cruel kinds of death; Schah Abbas II. with penalties almost as severe; Michael Feodorovitch Tourieff ordered a bastonade for the first offence, cutting off the nose for the second, and the head for the third offence: Prussia and Denmark simply prohibited, and James, of England, wrote against it. Finding, however, that no penalties, however severe, could check the indulgence in a luxury so highly appreciated, sovereigns and their governments soon found it much more advantageous to turn it into a source of revenue, and the cultivation and manufacture of tobacco was gradually subjected almost everywhere to fiscal regulations, restrictions, or monopolies, which still prevail under various forms over the greater part of Europe. In Tuscany its growth was prohibited, except in a few localities where it was allowed under certain restrictions from 1645 till 1789, when the enlightened Grand Duke Peter Leopold declared free the cultivation of tobacco over the whole territory. But the country did not long enjoy this privilege; the intrigues of private speculators prevailed on Ferdinand III. to restrict it to the same localities only which had previously possessed it. The number of these was further reduced in 1826, and the permission totally withdrawn in 1830, and tobacco is now only grown here and there by stealth.

Tobacco was in such general use in America when first dis-

covered, and is there so widely spread, that it is difficult to come to any conclusion as to what precise part of that vast continent is its native country; probably some portion of the Mexican empire. As to the precise dates of its introduction into Europe it has been already stated that it followed closely upon the discovery of America. The Spaniards under Columbus had scarcely landed in Cuba in 1492 when they began to smoke cigars; but they could only fully appreciate its luxuries when, in 1518, Fernando Cortez occupied the island of Tobago, where the plant was found growing in great abundance. Hernandez, the naturalist, was, it is believed, the first who brought it into Spain from Mexico, in 1539. It was introduced into Portugal from Florida by one Flamingo, and into France by Father André Thevet, or by some friend of his, although the more common opinion is that the first seeds received there were those sent about the year 1560 to Queen Catharine of Medicis by Jean Nicot, French ambassador in Portugal. It was probably raised also in England a few years later, but received no notice till its well known introduction by Sir Francis Drake from Virginia in 1586. In Tuscany it was first cultivated under Cosmo dei Medici, who died in 1574, having been originally raised by Bishop Alfonso Tornabuoni from seeds received from his nephew Mousignor Nicolò Tornabuoni, then ambassador at Paris, a great amateur of plants. After him it long bore the name of *Erba Tornabuoni*.

A second but smaller and coarser species, *Nicotiana rustica*, much grown in some parts of South-eastern Europe, is generally said to be a native of Europe and Asia, but this is a mistake; like the *N. tabacum* it is of American origin. So also is the long white-flowered Shiraz tobacco, recently published under the name of *Nicotiana persica*, but which is a mere variety of the *N. longiflora*, a species not uncommon in South America, and introduced from thence like the others since Columbus' discovery.

Amongst the Cassias supplying the *Senna* leaves of our Pharmacopœias, the annual species (*Cassia obovata*), introduced most probably by the Moors during their dominion in Sicily, from Egypt and Arabia, was much cultivated in Italy, especially in Tuscany, during the sixteenth and seventeenth centuries. It is now totally neglected, nor would it be profitable except in the Maremma, where its cultivation is strongly recommended by Prof. Targioni.

The *Castor-oil plant*, or *Palma-Christi* (*Ricinus communis*), was known to the ancient Hebrews, Egyptians, and Greeks, as

supplying an oil for burning, for which purpose it was much cultivated in Egypt, Arabia, and India, and is so to this day, although the consumption of the oil is now for medicinal rather than for economical purposes. It had never till of late years been cultivated in Italy, but is among the plants recommended for fertilizing the Maremma. Its native country is uncertain. The south of Europe, the coasts of Africa, and East India are generally indicated, but it is certainly not wild in India, and apparently only self-sown in the south of Europe. It may however be really indigenous in Upper Egypt and other districts of Northern Africa.

Of *Fruit-trees* the first in importance for the Italians is the *Olive* (*Olea europea*). Its great productiveness, longevity, and hardihood against every thing except cold, have extended it over all countries whose climates it will bear, and the origin of its cultivation is lost in the remotest ages of antiquity. From the Holy Scriptures, as well as from the early Greek writers, it appears to have been as general in their days as in ours in Greece, the Holy Land, and North Africa. There has been some discussion as to the period when the Romans first planted it in Italy, Pliny asserting, on the authority of Fenestella, that it was unknown in Italy, Spain, or Africa, in the time of Tarquinius Priscus (in the year of Rome 133). Yet Pliny also states that the Gauls' inroad into Italy at about the same period was for the acquisition of *oil*, grapes, wine, figs, &c. However that may be, it is very certain that the Greeks long preceded the Romans in the cultivation of a number of varieties of olive more productive than the wild plant.

The olive is perhaps the longest lived amongst European trees. The youthful vigour of individuals known to be three or four hundred years old; the great tenacity of life observed in the root or stock, throwing up suckers for instance in olive grounds abandoned and converted into sheep walks for upwards of two centuries, and that in a climate where the branches are frozen down two or three times every century; the numerous traditions of trees supposed to be eight hundred, a thousand, or more years of age; the extraordinary manner in which it will resist every ill-treatment inflicted on it by neglect or wantonness, and which gives rise to the common saying in the South, that you cannot kill an olive-tree—all render it more than probable that those venerable olive-trees so beautifully described by Lamartine as now overshadowing the vale of Gethsemane are the identical trees under which our Saviour underwent his blessed agony.

The olive grows naturally in the East, from Greece and Syria to Persia and Afghanistan, and is without doubt really indigenous to the whole of that region. It is also found wild in great abundance in Southern Italy, but how far it may there be the degenerate offspring of self-sown olives from cultivated sources, is a matter of much dispute among Italian writers, and is here discussed by Prof. Targioni, who concludes with much plausibility that it is a true native.

The *Grape Vine* (*Vitis vinifera*) must, as already observed by Pliny, be ranked amongst trees on account of the prodigious size it will attain.* This may be more especially observed in the Maremma, where it grows wild in the greatest abundance. It appears to be there, as in other parts of Southern Europe, truly indigenous, extending from thence over the greater part of South-central Asia, for the *Vitis indica*, on the testimony of the more recent Indian botanists, is by no means specifically distinct. From these wild vines have evidently been raised the innumerable varieties cultivated over the greater part of Europe, Asia, and North Africa, and now carried out to all parts of the globe where the climate will admit of it. But the period when it was first taken into cultivation, is lost in the obscure ages of antiquity. We read in the Genesis that after the flood Noah began to plant the vine; the heathens ascribed its first introduction to their fabulous heroes or divinities, Diodorus Siculus to Osiris, Servius to Saturn, and in the most ancient times Italy was called *Ænotria* from the wine that it produced.

* Among the instances given of enormous vines, we may quote the following: Pliny records a vine in the Porticos of Livia, which overshadowed the whole area used as a promenade, and yielded annually twenty-two amphoras (154 gallons) of wine; the same writer states that he had seen at Populonia a statue of Jupiter, made of the trunk of a vine, and that the columns of the temple of Juno at Metapontus, and the steps of that of Diana of Ephesus, were also of vine wood. In more modern days, Soderini mentions a vine in Portico di Romagna, which extended over 1000 braccia (2000 feet); in the Mém. de l'Académie of Paris for 1737, a muscat vine at Balançon, is described, which at twenty years old produced 4206 bunches of grapes. Giovanni Targioni-Tozzetti, our author's grandfather, in his travels in Tuscany, quotes one in the woods near Montebamboli, the trunk of which two men could not embrace. Santi found a vine at Castellottieri in the Maremma, torn up by a storm in 1787, whose trunk is preserved in the botanic garden at Pisa, with a stem five and a half feet in circumference; and Prof. Targioni has himself recorded in the article "Botanical Chronology" in the *Dictionary of Natural History*, printed at Florence by Batelli, two vines near Figliini, in the upper Val d'Arno, with trunks five feet in circumference. The doors of the Cathedral of Ravenna are made of vine wood.

We have already observed that the varieties of the grape are most numerous; they are also often so strongly marked as to cause many writers to deny the possibility of their having all sprung from the wild vine, but their apparent permanence is in most instances only due to their universal propagation, by cuttings or layers, not by seed. Pliny records eighty kinds, and many others are mentioned by Virgil, Columella, Varro, Macrobius and other writers, which it is now impossible to recognise with certainty amongst the modern varieties, amounting in some collections to above three hundred. Fée, Galesio, and others have however endeavoured to identify some with more or less plausibility, of which the following are a few instances:—

The *Apiana* of Pliny, or *Apicea* of Cato, is supposed to be a muscat imported from Greece, and it is believed that most of the muscat-flavoured varieties were originally raised in the Archipelago.

The *ambrosiaca* is believed to be another muscat.

The *gracula* is the Corinth stoneless, or currant grape.

The *rhatca* the uva passa of Spoleto, another stoneless and currant grape.

The *venicula*, *sircula*, or *stacula*, is the marzemina of the Venetians.

The *dactylites* is perhaps the uva galletta of modern Italy.

The *trifera*, the uva di tre volte from Chio.

The *picina*, perhaps the uva colore.

The *trebulana*, the Trebbiano, yielding a wine celebrated for its excellence by Tasso.

Others of the Roman names are derived from the countries whence the varieties were imported, such as the *biturgica* from Bordeaux, the *phaia* from Illyria, the *prusina* from Broussa in Anatolia, the *ægios* from Ægia near Corinth, the *alexandrina* from Alexandria in the Troas, the *aminea*, a highly prized variety, from Aminei near Falerno, &c. The eagerness to import into Italy the vines of other countries celebrated for the excellence of their wines has continued to the present day, Prof. Targioni adducing many proofs of its prevalence in the middle ages. It is a pity the Italians do not at the same time introduce the modes of treatment and manipulation, to the deficiencies in which must be mainly attributed the general inferiority of Italian wines to those produced in similar climates in France and Spain.

Great attention has been paid in Tuscany to the cultivation of *dessert fruits*, from the time of the ancient Etruscans, as

attested by numerous early Roman writers, and continued to the present day. The discovery of the cultivation of fruits was attributed by the Romans to Janus, their amelioration and extension to Vertumnus and Pomona, all three of them Etruscan divinities; and the origin of the multiplication of garden varieties is therefore lost in the fabulous ages. Pliny, and other even earlier geoponical writers, give indications of no small number of varieties of pears, apples, cherries, plums, &c., of which it is probable that several have descended to us, but from the mere names handed down without descriptions, it is hopeless to attempt to identify any considerable proportion of them; moreover it is very certain that entirely new varieties are daily introduced, whilst several of the old ones are as undoubtedly lost.

The flourishing times of the Florentine republic were peculiarly favourable to the development of horticulture and agriculture. The unquiet life which the nobles and great families led within the town, exposed as they were to the suspicions of a turbulent populace, induced them to retire for security to their estates, occupying themselves with their improvement, whilst the rich merchants and magistrates spent their holidays in their suburban villas, which they adorned with gardens, importing plants from all countries, and especially introducing new fruits from Greece. A manuscript piece of poetry in the Magliabechian library, entitled "Verses (Capitolo) on the table of fruits to be offered to a guest," shows the great variety cultivated in the neighbourhood of Florence in the fifteenth century. Three baskets are there represented; the one full of grapes, figs, pears, apples, lemons, &c.; the second with cherries, plums, peaches, apricots, and other stone fruits; the third with almonds, walnuts, oranges, citrons, chesnuts, and several inferior fruits; thus supplying a list of those most generally known at that period. The Grand Dukes of the Medici family paid particular attention to the enrichment of their gardens. Father Agostino del Riccio informs us that Cosmo I. was the first to introduce plantations of dwarf fruit-trees, and that he and his successors annually increased the number of varieties introduced and cultivated for their tables.

The *Pear* (*Pyrus communis*) and *Apple* (*Pyrus malus*) are found in their wild state in the mountain woods of all Italy, as well as of the greater part of Europe, and from these indigenous species have been raised the whole of our orchard and garden varieties. Their amelioration by cultivation, and the perpetu-

ation of varieties by grafting, have been celebrated by poets from the time of Ovid, and continue to the present day. Pliny enumerates thirty-nine different pears known to the Romans, several of them being also mentioned by Virgil, Cato, Columella, Juvenal, Macrobius, &c. Fée has endeavoured to identify some of them with modern French varieties, and Gallesio with Italian ones, as in the following examples:—

PLINIAN NAMES.	SUPPOSED CORRESPONDING MODERN NAMES
Amerina serotina	San Tommaso.
Lactea	Perle or Blanquette.
Dolabelliana	Winter Bon-Chrétien.
Falerna succosa	Bergamot.
Favoriana rubra	Large muscat.
Superba parva	Little muscat.
Hordearia	Common muscat.
Mustea	A variety of Bon-Chrétien.
Picena or picentina. . .	Spina.
Pompeiana mammosa. .	Campana.
Viridis	Spadona vernina, considered by Gallesio as a most ancient Italian Pear.
Myrapia	Guignoline.
Volema	Another Bon-Chrétien.

In Tuscany, under the Medici, we find, in a manuscript list by Micheli of the fruits served up in the course of the year at the table of the Grand Duke Cosmo III., an enumeration of two hundred and nine different varieties of pears, and another manuscript of that time raises the number to two hundred and thirty-two. Among them grafts of the Dorice pear of Portugal were introduced by the same Grand Duke, at a cost of one hundred golden doubloons, whence it received the name of *Pera cento doppie*, by which it is still known, as well as by that of the *Ducal pear*.

Apples have been believed by some to have been introduced into Italy from Media, and that the Falisci, or inhabitants of Montefiascone, were the first to plant them in rows. But this must apply to some particular variety, not to the species, which we have already stated to be indigenous, but very early cultivated. Pliny enumerates twenty-three varieties, which appear still more difficult to identify with ours than the pears. Among the few that modern authors have recognised, the *Appiani* of the Romans are supposed to be the *Appie* or *Appiole* of modern Italians, the *Appia pyriformis* to be the Appiolona lunga, the *Syriaca ruberrima* to be the red Calvetto, &c. In more modern Tuscany, Micheli, in his above-mentioned manuscript, describes fifty-six sorts under the Medici princes, fifty-two of which are figured by Castello.

The *Quince* (*Pyrus cydonia*), also a European plant and indigenous in Italy, has given rise to much fewer varieties, although equally in cultivation since the days of the ancient Greeks and Romans. Pliny enumerates five only, including probably the three principal ones of more modern days, described by Matthioli in the sixteenth century, viz. : 1. the common large apple-shaped quince, *melo cotogna* of the Italians, the best and highest flavoured variety, which is the *mala aurea* and the *mala cana launGINE* of Virgil, and *mala cotonea* of Pliny, said by him to have been introduced from Crete in the days of Galen; 2. the pear-shaped quince or *pera cotogna*, called by Dioscorides, Galen, and Pliny *Struthium*, which attains a larger size than any of the others; and 3. the *Milriana* of Pliny, called in Matthioli's days *bastard quince*, probably our wild indigenous variety. The two former, especially the first, may have been originally raised in Palestine, where quinces are common, and were appreciated for their odour in very ancient days, as appears by their mention in the Bible. The golden apples of the garden of the Hesperides have by some been supposed to be quinces, whilst others have with more plausibility referred them to the orange. On the other hand, the nuptial apple prescribed by Solon was evidently the quince and not the lemon. Quinces are at the present day much prized by the peasantry in some parts of the south of Europe for perfuming their stores of linen, independently of their consumption for culinary and confectionery purposes.

The *Medlar* (*Mespilus germanica*) is common in the woods of Italy and Sicily, and the assertion of Pliny that it did not exist in Italy at the time of Cato must be erroneous. Theophrastus calls it *setancios*, as does Dioscorides, who also gives it the names of *mespilon* and *epimelida*, and says that it is a native of Italy. It extends over a great part of Europe, and is cultivated in Italy, though more sparingly and less appreciated than in Germany and England. Besides the common one the Italians have a larger variety, and a small one without stones.

We fully concur with Prof. Targioni in his conviction that the wild *Cherry* (*Prunus cerasus*), common in the woods of Italy and other parts of Europe and Asia, is the mother plant of all the kinds of that fruit now in cultivation, in opposition to many modern botanists, who follow De Candolle in distinguishing four species, *Cerasus avium*, *C. duracina*, *C. Juliana*, and *C. caproniana*, or even go far beyond him in their multiplication. The species is also evidently indigenous, notwithstanding Pliny's statement

that there were no cherries in Italy, before the victory obtained over Mithridates by Lucullus, who was the first to bring cherries to Rome in the year of Rome 680, and that within one hundred and twenty years after that, they were spread over the empire as far as Britain. This statement gave rise to the tale that cherries came originally from Cerasunte, now Zefano, and were therefore called *cerasus* by the Latins. Lucullus may, however, have first imported the cultivated varieties, which the Romans may not have recognised as identical with the wild cherry. In Greece, cherries were certainly known long before his time, for Diphilus Siphnius, according to Athenæus, mentions them under the government of Lysimachus, one of the dukes of Alexander the Great.

Among the numerous varieties of cherries of modern days, Pliny records only eight, of which the *Juliana*, according to Matthioli and Micheli, is the *acquaiola* of modern Italy, and the *ceciliana*, according to Micheli and Galesio, is the *visciolona*, believed to have been brought from Arabia into Spain, and thence to Rome. The varieties known in modern Tuscany are chiefly due to the exertions of the Grand Dukes of the Medici family. Micheli, in the catalogue already quoted, enumerates forty-seven sorts, and Castello has figured ninety-three. The double-flowering variety was first introduced into the gardens of Florence, by Giuseppe Benincasa Fiammingo, curator, under Francis I. of Medicis, of the botanic garden then called *delle Stulle*, afterwards *dei Semplici*.

The cherry-tree, especially of the *Bigarreau* variety, grows to a very large size; one is recorded on the shores of the gulf of Nicomedia, of which the circumference of the trunk was four and a half braccia (about nine feet), and Prof. Targioni himself had one cut down in his own *podere*, which was beginning to decay, and had a trunk of eight feet in circumference.

The *Plum* (*Prunus domestica*) is said by Prof. Targioni, after the generality of systematic botanists, to be indigenous to the woods of Italy, and an expression is quoted of Pliny's to the same effect, "*sed pruna sylvestria ubique nasci certum est.*" But these *pruna sylvestria* must have been the *Sloe* (*Prunus spinosa*). Our garden plums appear, from the investigations of our Indian botanists, to be varieties produced by long cultivation of the *Prunus insititia*, a species common in the mountains of Asia, from the Caucasus to the Eastern Himalaya, but which we have no authentic evidence of being a native of Europe. In all the more accurate European floras, the *P. domestica* and *insititia* are

either omitted, or inserted as doubtful natives or escaped from cultivation; or if in some instances positive native stations are given for the *P. insititia*, it is generally some variety of the *P. spinosa* that has been mistaken for it.

Several varieties of the garden plum were introduced by the ancient Romans from the East, as we are informed by Pliny, since the days of Cato, who was born two hundred and thirty-two years before the Christian era. Such was, for instance, the *damson* or *damascene plum*, corrupted into *moscine* by the Italians, which came from Damascus in Syria, and was very early cultivated by the Romans. This was probably the early or summer damson, not known in Tuscany in the time of Micheli; but another similar variety, much cultivated in Liguria, the autumn or winter damson, was brought there from the East by the Genoese returning from the Crusades. Muratori says that the Italian name for the plum, *Susine*, was derived from Susa in Persia, whence it had been introduced into Italy. But the most ancient Latin name was *prunus*, and with the Greeks *coccymela*.

Pliny enumerates eleven varieties of plums, amongst which the *cerina*, mentioned also by Virgil and Ovid, is, according to Fée, the Mirabelle; the *purpurea* is said to be the myrobolan, which however cannot be the case, if the latter be, as is supposed, of American origin; and the *damascena* is the summer damson. In Tuscany a considerable number are enumerated as very common, by Matthioli, in the sixteenth century. At a later period, Father Agostino del Riccio mentions several as new since he was young, and amongst them the myrobolans, said to be natives of North America. Canon Lorenzo Panciatici gives the names of eighteen sorts, as common in the seventeenth century; and Micheli has fifty-two in the above-quoted manuscript list of fruits for the Grand Ducal table, and seventy-three in another of rare plants cultivated in Tuscany.

The *Almond* (*Amygdalus communis*) is said to be really indigenous in several of the floras of the Southern and Eastern Mediterranean regions, including Southern Italy and Sicily, but it is extensively cultivated and grows so readily over the whole of South Europe that it may in many instances have spread from cultivation. It is however probably a true native, at least of Crete and Syria. It was well known to the ancients, and is supposed to be the *Sciakedin* of Scripture, sent as a present to Joseph in Egypt, from the land of Canaan. Dioscorides and Galenus speak of its medicinal properties under the name of

Thassia picra, and *amygdaleas*. Pliny doubts whether almonds were known in Cato's time, because he considers that the last-named writer meant walnuts when speaking of *Greek nuts*, but the majority of commentators agree in referring that name to almonds. In modern days the varieties grown in Southern Europe have become very numerous. Micheli describes ninety-four, but his distinctions are very refined, and taken often from accidental forms; the specimens from which he described them are still preserved in Prof. Targioni's collections.

Pliny, as well as Linnæus and most modern botanists, includes amongst plums the *Apricot* (*Prunus armeniaca*), a tree most extensively cultivated, and which sows itself very readily in cultivated grounds over South-eastern Europe, Western Asia, and East India, but its native country is very uncertain. Targioni says, on the authority of Reyner, an Egyptian traveller, that it is of African origin, but does not give the precise locality, and we have neither seen nor heard of any really wild specimens. The ancients called it *Armeniaca* as having been brought from Armenia into Italy, where it is not indigenous; also *præcoca*, *præcoqua*, and *præcocca*; and under one or other of these names it is mentioned by Dioscorides, by Galen, by Columella (who is the first who speaks of its cultivation), by Pliny, (who, about ten years after Columella, asserts that it had been introduced into Rome thirty years), by Martial, &c. Democritus and Diophanes give it the name of *bericocca*, analogous to the Arabian *berkac* and *berikhach*, the probable origin of the Italian names of *bacocca*, *albicocca*, and even, according to Cesalpin, *baracocca*; and, lastly, Paolo Egineta, according to Matthioli, has spoken of these fruits under the name of *doracia*. Although some of these names, even in modern times, have been occasionally misapplied to a variety of peach, yet they all properly designate the apricot, and show that that fruit was known in very remote times. Having never been much appreciated, except for its odour, there was not in former days any great propagation of varieties of it. Micheli, however, under the Medicis, enumerates thirteen among the fruits cultivated for the table of Cosmo III.

The *Peach* (*Amygdalus persica*) is, according to the common opinion, of Persian origin. Diodorus Siculus says that it was carried from Persia into Egypt during the time that Cambyzes ruled over that country. It is supposed to have been transported from thence into Greece, and, after a lapse of time, into Italy, where it only began to be known about twenty years before the

birth of Pliny, that is, about seven years before the Christian era, and it appears that Columella was the first to treat of its cultivation there. According to Nicander it was brought to Greece by the agency of Perseus from Cepheia, a locality affirmed by some to have been in Persia, by others in Æthiopia or in Chaldæa. The peach is also spoken of by Theophrastus, Dioscorides, and other Greek writers. We must therefore conclude that this fruit was well known in the East very long before its introduction into Italy. Many ancient writers, including Athenæus and Pliny, and some more recent ones, as, for instance, Marcellus Virgilius, in his Commentaries on Dioscorides, confound the peach with the *persen*, a fruit the identity of which is uncertain, some supposing it to be a *Cordia*, others a *Balanites*. Macrobius again confounds the peach with the *persicum* of Suevius, which is the walnut, and with that of Cloatius, which is the citron; all fruits resembling the peach in nothing but in the name, a clear proof that it cannot have been in their days by any means a common fruit. How few were the varieties of peach known to the ancients appears from Dioscorides who only names two, from Pliny who enumerates five, and Palladius four only, giving at the same time accurate information on the mode of cultivating them.

With regard to the introduction of the peach into Tuscany, it appears that several varieties were known already in the days of the Republic, but that the greater number were, as in the case of other fruits, due to the exertions of the Medici sovereigns. Matthioli, in the sixteenth century, enumerates a considerable number as then in the possession of Tuscan cultivators; Micheli, under Cosmo III., has forty-three, and in the drawings of Castello are represented about thirty. That called *Poppe di Venere* (the *Late Admirable* of our Horticultural Catalogue) is supposed to be one of the most ancient in Italy, and is mentioned by Agostino del Riccio and Micheli, under the name of *Pesche Lucchesi*.

Although all the evidence collected by Prof. Targioni tends to show that the peach was originally brought from Persia, and he therefore does not consider it necessary to proceed further with the investigation, yet no traveller whom we can rely upon has ever found it growing really wild there or anywhere else. We are therefore left in doubt whether its native stations remain yet to be discovered, or whether its original wild type must be sought for in some species of *Amygdalus* known to be indigenous in the East. It has been more than once suggested that this original

parent is no other than the common almond, a conjecture founded perhaps on the similarity in the leaves and in the perforations of the endocarp, but rejected as absurd by those who attach even generic importance to the succulence of the indehiscent pericarp. This point cannot be decided with any degree of plausibility until we shall have a better knowledge of the different forms which the fruits of wild *Amygdali* may assume under various circumstances; but we may mention, as circumstances in some degree favouring the supposition that some kind of almond is the parent of the peach, the ancient tradition referred to by Targioni (with the remark that it is contradicted by Pliny, and by common sense) that the peach in Persia was poisonous, and became innocuous when transported to Egypt, and the case quoted of a supposed hybrid raised in 1831 in Sig. Giuseppe Bartolucci's garden, at Colle di Val d' Else, from a peach-stone which produced fruits at first exactly like almonds, but which, as they ripened, assumed the appearance and succulence of peaches, whilst the kernel remained sweet and oily, like those of almonds. We might also refer to some bad varieties of peach with very little juice to their pericarps, although we do not know of any which assume the flattened form of our almond, a distinctive character which appears to us to be of considerable importance. The foliage and flowers of the two trees show little or no specific difference.

The *Jujube* (*Zizyphus vulgaris*), a common tree in the Levant, is also now found wild in various parts of South Italy and Sicily, but Italian botanists are much divided in opinion as to whether it is really indigenous, or become naturalised only after cultivation. Prof. Targioni, after Bertoloni, adopts the former opinion, and considers that the erroneous belief in its exotic origin arises from a mistaken assertion of Pliny's that jujubes did not exist in Italy prior to their importation from Syria by the Consul Sextus Papinius towards the end of the age of Augustus. Among the ancients, Hippocrates considered the fruits as medicinal; Galen depreciated them both as medicine and as food. Modern cultivation has produced a few varieties, and there is a considerable consumption of them in some parts of the south of Europe either as an inferior raw fruit, or for the manufacture of the pectoral lozenges known as *pâte de jujube*; but they are little appreciated in modern Italy, and were still less so in earlier times.

We learn from Pliny and Galen that the *Pistachio-nut* (*Pistacia vera*) is a native of Syria, and from the former writer

that it was first introduced into Italy towards the end of the reign of Tiberius (who died A.D. 37) by Lucius Vitellius, afterwards Emperor, and that at about the same time it was carried into Spain by Flavius Pompeius, a Roman knight, companion in arms to Vitellius. Well known to the ancients, it is supposed by some to be the *batum* of Scripture, and generally believed to be the *Indian terebinth* indicated by Theophrastus as a native of Bactria. It is mentioned by Nicander and Dioscorides under the names of *pistacia*, *bistacia*, and *phistacia*. In Sicily it is of very ancient cultivation, and there called *fustucha* or *fastuca*. It is now extensively planted in some parts of the Southern and Eastern Mediterranean regions, and might be so in Tuscany, where a few trees, scattered here and there, ripen their fruits well.

Notwithstanding the above-quoted indications of the eastern origin of the pistachio, it remains to be ascertained where it is truly indigenous, and what is its real wild typical form. Botanists give as its native habitat Syria, Persia, East India, Arabia, and Barbary, but in most of those countries it is certainly only known in a cultivated state. We have seen no wild specimens in our largest herbaria, and find no reliable indications of any native stations in local floras. Targioni mentions a variety *narbonensis* as having become wild in great abundance in the neighbourhood of Montpellier, but during several years' herborisations in that country we never saw any species at all allied to it except the common small-fruited *Pistacia terebinthus*. The authority of Gasparrini is also quoted for a hybrid between *P. vera* and *P. terebinthus*, which, according to Sestini and Boccone, has multiplied itself in various parts of Sicily. If that be the case it would lead to a strong presumption that notwithstanding the great difference in the size and shape of the fruit, the *P. vera* and the *P. terebinthus*, and consequently also the *P. mutica* of the Crimea and Asia Minor, are mere varieties of one botanical species common in the Mediterranean region from Spain to the Black Sea and Asia Minor.

The *Walnut* (*Juglans regia*) is a native of the mountains of Asia, from the Caucasus almost to China. It is supposed to be the *Enoz* of the Bible. The Greeks had it from Asia; and Nicander, Theophrastus, and others mention it under the names of *carya*, *carya persica*, and *carya basilike* (or royal nut). Pliny informs us that it was introduced into Italy from Persia, an introduction which must have been of early date, for, although it be doubtful whether it is alluded to by Cato, it certainly is mentioned

by Varro, who was born in the year 116 B.C. The Romans called it *nux persica*, *nux regia*, *nux Eubœa*, *Jovis glans*, *Djuglans*, *Juglans*, &c. They recognised several varieties, and amongst them the soft-shelled walnut still cultivated, which several commentators have confounded with the peach. In modern days the cultivation has much extended, and the number of varieties considerably increased. Jean Bauhin noticed six only. Micheli, under Cosmo III. of Medicis, describes thirty-seven, of which the original specimens are still preserved; some of these, however, are scarcely sufficiently distinct from each other.

The *Nut* (*Corylus avellana*) is said by Pliny to derive the name of *Avellana* from Abellina in Asia, supposed to be the valley of Damascus, its native country. He adds that it had been brought into Asia and Greece from the Pontus, whence it was also called *nux pontica*. Theophrastus calls these nuts by the name of *Heracleotic nuts*, a name derived from Heraclea, now Ponderachi, on the Asiatic shores of the Black Sea. Hippocrates gives them the name of *carya thusia*. Dioscorides says they were also known by the name of *leptocarya*, or small nuts. Other ancient writers confound the nut with the chesnut and the walnut. But all the above indications of importation from the East relate only to particular varieties, for the species, as is well known, is common enough in Italy as in the rest of Europe and a great part of Asia in a really wild indigenous state.

The *Chesnut* (*Castanea vesca*), celebrated amongst European trees for the enormous size it will attain, is already mentioned in the Bible. Theophrastus and Athenæus give it the name of Eubœan nut, from the island of Eubœa, now Negroponte, where it was peculiarly abundant. Pliny says that chesnuts first came from Sardi, the ancient capital of Lydia, and not far from the modern Smyrna. Galen, who was a Lydian, confirms that origin, and says that they were also called *balani leuceni*, from Leucene, situated on Mount Ida. Other writers, ancient and modern, give various Eastern countries as the native stations of the chesnut, and even Giovanni Targioni-Tozzetti, our author's grandfather, believed them to be introduced only into Italy; but not only have the extensive chesnut woods in the Apuan Alps and other parts of the Apennines, mentioned by Bertoloni, every appearance of being really indigenous, but further evidence that woods of this tree existed in Tuscany from very remote times, may be found in the number of places which have derived their names from them, such as Castagna, Castagnaia, Castagneta, &c.

We may indeed safely give as the native country of the wild chesnut, the south of Europe from Spain to the Caucasus. It does not extend to East India.

The larger fruited varieties which we import for eating, and which are generally distinguished in France and Italy under the name of *marrons* or *marrone*, were probably those which were first introduced from the East by the Romans. Pliny enumerates eight different varieties. Micheli has forty-nine, most of which, however, from his own specimens are, as in the case of the other fruits mentioned in his manuscript, founded upon distinctions too slight to be really available for their separation.

The *Fig* (*Ficus carica*) is a native of the south of Europe, including Greece and Italy, of Northern Africa and of Western Asia. The wild type known in Italy by the name of *Caprifico*, has indeed been distinguished by Gasparrini not only as a species but as a separate genus, but we cannot but concur with Prof. Targioni in the opinion, confirmed by positive assertion on the part of practical pomologists both ancient and modern, that our garden figs are of the same species and have repeatedly been raised from seeds of the wild caprifico.

We find mention of the cultivation of figs, and of the high estimation in which these fruits were held, in the very earliest writings, in the Holy Scriptures, as in Homer's *Iliad*. Those of Athens were celebrated for their exquisite flavour. Xerxes was tempted by them to undertake the conquest of Attica, in the same way that Cato urged the Romans to that of Carthage, a fig in his hand. The number of varieties, however, produced in ancient Italy were not numerous. Six only were known in the time of Cato. Others were afterwards introduced from Negropont and Scio, according to Pliny, who gives a catalogue of thirty sorts. Their names are mostly taken from the countries whence they had been brought, such as the African, the Rhodiote, the Alexandrine, the Saguntine, &c., or from some great personage who had introduced or patronised them, such as the Pompeian from the great Pompey, the Livian from Livia, the wife of Augustus, &c. Macrobius, two centuries after Pliny, enumerates twenty-five, but generally under names different from those of Pliny. Galesio, in his *Pomona Italiana*, has referred a few of those ancient names to modern Italian varieties, as for instance:—

The *Albicerata* to the white fig of the Italians.

The *Tiburtina* to the gentle.

The *Africana* to the brogiotto nero, which some believe to be also the *Emonio* of Athenæus.

The *Liviana* to the pissalutto.

The *Lydia* to the *fico trojano*, very abundant at Naples.

The *Carica* to the *dottato*, common in the Levant, and originally from Cauni in Caria, from whence so many were sent to Greece and called on that account *cauni figs* and *Carica*.

In Tuscany, the varieties of figs cultivated are numerous, many of them due to the days of the Republic. Fra Agostino del Riccio, in his already-quoted manuscripts, gives a selection of thirty-one sorts cultivated in Tuscany in the middle of the sixteenth century, adding that there were many others which he had not included, not having seen them himself. Those of the Medici gardens represented in the drawings of Castello comprise eighteen early and thirty-two late sorts, in all fifty; and Micheli in his manuscripts carries the number up to ninety-five.

Notwithstanding the softness of the wood, and the readiness with which the branches are killed down, the trunk of the fig-tree is remarkable for its longevity. Pliny tells us of an aged wild fig in the forum, which was in a dying state in his days, but which they dared not cut down on account of the tradition that under its shade the wolf had suckled Romulus and Remus; that another wild fig in the forum had arisen over the chasm into which Curtius had precipitated himself, and was preserved in memory of that feat; and that a third similar tree, which dated from before the time of Saturn, was cut down in the year of Rome 260 to erect the building where the vestals were placed. These tales may indeed not be true in their details, but the trees they relate to must have been known to have been several centuries old.

Prof. Targioni alludes to the practice of caprification, or of the supposed artificial fecundation of cultivated figs by the caprifico or wild fig, and quotes several writers, ancient and modern, who describe the operation. He does not appear to be aware of the able memoir of Gasparrini, translated in the 3rd Vol. of this Journal, giving a detailed history of the origin and extent of the practice, and satisfactorily proving its inutility as well by practical experiment as by theoretical argument, and showing at the same time how we must account for the perseverance with which the inhabitants of certain localities have kept it up from the earliest ages on record to the present day.

Mulberries, of Asiatic origin, were well known to the ancients, who cultivated them for their fruit, either for eating or as medicinal.

They are mentioned by Theophrastus and Dioscorides, and also by Athenæus and Galen, and, among the Romans, Virgil, Horace, Pliny, Columella, and Palladius speak of them as common and well known. All these writers are supposed to refer to the *Black Mulberry* only (*Morus nigra*), now but little valued and seldom to be met with in Italy, although at the first introduction of silkworms it is supposed to have been exclusively made use of in raising them. It is even said to be indigenous to the Italian sea coasts as well as to Persia. We have, however, been unable to find any wild specimens in any of our herbaria, and modern botanists meet with it only in a cultivated state in East India, as in Europe. The only native station given with any confidence in modern floras is the chain of the Caucasus and some adjoining mountains.

The *White Mulberry* (*Morus alba*), now spread over all parts of Europe and Asia where the silkworm is raised, and almost everywhere the only species cultivated for that purpose, is a native of Northern India and China. It is said to have been unknown to the ancients. A passage of Ovid, quoted by Prof. Targioni, alludes indeed to the white fruits of the mulberry, but this is considered by the late Prof. Moretti, who devoted a great part of his scientific life to the mulberry, to be a mere poetical license. Another of Berytius, also quoted by Targioni, states that the Mulberry bears white fruits when grafted on the white poplar, but in our days this can only provoke a smile at its evident absurdity. Yet a variety of the white mulberry, said to be delicious eating, but unknown in Europe, is now abundant in Beloochistan, Affghanistan, and probably in Persia, and apparently of very ancient cultivation there. It is therefore by no means impossible that some knowledge of it may have reached such of the ancient writers as may have been in the East, or had communication with it.

However that may be, it appears certain that the introduction of the white mulberry into Italy is of a date long posterior to that of the silkworm. These valuable insects were imported into Sicily, in 1148, by King Ruggieri, after he had in his wars with Manuel Comnenus conquered Thebes, Athens, and Corinth. It is commonly said that the Lucchese learnt the art of raising them from the Sicilians, and introduced it into Florence, when, in 1315, they took refuge there from the sack of their own city. Pagnini has however proved that silk was produced in Florence in and previous to the year 1225, and from the histories and

chronicles of Malespini, Villani, and Ammirato, it would appear that there were silk factories there before 1266. All this time the leaves used were those of the black mulberry, as clearly appears from a passage of Pier Crescenzo, who wrote about the year 1280. Several statutes of the fourteenth century relate to the plantation of the mulberry without any thing to indicate which species they allude to, whilst all writers of the sixteenth century distinguish the white silkworm mulberry from the black-fruited. It would appear then that in the course of the fifteenth century, the former had gradually, but entirely, superseded the latter. It is indeed commonly supposed that the cuttings were first brought into Tuscany from the Levant, by Francesco Buonvicini, in 1434, and that already in the following year 1435, a law dated 7th of April encouraging its cultivation related to this new species.

The *Red Mulberry* (*Morus rubra*), a North American species, is to be found here and there in Italian gardens; it is of recent introduction and does not appear ever to have been planted for silkworms. The one so called which Father Agostino del Riccio says that Francis I. of Medicis had extensively sown in the Boboli Gardens, and in the islands of the Cascine at Florence, is supposed to have been a red-fruited variety of *Morus alba*. Several other varieties of this species have also, in modern days, been brought from Eastern Asia or raised in European plantations, and sent forth as new and most valuable species under the names of *Morus latifolia*, *macrophylla* or *Morettiana*, *multicaulis*, *sinensis*, *philippinensis*, *japonica*, &c.

A long chapter is devoted by Prof. Targioni to the *Agrumi*, that is, to the oranges, lemons, citrons, and others belonging to the genus *Citrus* of the family of *Aurantiaceæ*. They have long been objects of great interest to the Italians and the subject of many valuable works, being extensively cultivated for profit wherever the climate will admit of it, and for ornament or curiosity in public or private gardens in the more northern parts of the Peninsula, where they still require protection in winter. They are all of Eastern origin, and mostly introduced into Europe in comparatively modern days, but of very ancient and general cultivation in Asia. The varieties known are very numerous and difficult to reduce accurately to their species, on the limits of which botanists are much divided in opinion. Those who have bestowed the most pains in the investigation of Indian botany and in whose judgment we should place the most confidence, have

come to the conclusion that the citron, the orange, the lemon, the lime, and their numerous varieties now in circulation, are all derived from one botanical species, *Citrus medica*, indigenous to, and still found wild in, the mountains of East India. Others, it is true, tell us that the citron, the orange, and the lime are to be found as distinct types in different valleys, even in the wild states; but these observations do not appear to have been made with that accuracy and critical caution which would be necessary in the case of trees so long and so generally cultivated.

With regard to the *Shaddock* (*Citrus decumana*), it is almost universally admitted as a distinct species, although at present only known in the state of cultivation. It must be admitted also that it appears to present more constant characters than most of the others in the pubescence of its young shoots and in the size of its flowers, besides the differences in the fruit; but Dr. Buchanan Hamilton, who is of great authority on such matters, and some others, are inclined to believe that this also may have originated in the *Citrus medica*. This point requires much farther investigation, and a better knowledge of the floras of South-eastern Asia, before we can come to any plausible conclusion.

Prof. Targioni gives copious details of the introduction into Tuscany and other parts of Italy, of many of the varieties there cultivated, for which we must refer to the work itself. It may suffice, for our present purpose, to extract a few notes on some of the more important races or species according as they may be considered. Among them all the earliest known was the *citron*. It is not, however, that fruit nor any other citrus, according to Prof. Targioni, that we read of in the Bible under the name of *Hadar* as is asserted by some, nor yet is it anywhere alluded to by Homer. The first mention we have of it is in a comedy of Antiphanes quoted by Athenæus, in which it is said that the seeds of the citron had then recently been sent by the King of Persia as a present to the Greeks. Theophrastus is the first who describes it; he tells us that the fruit was not eaten, but solely prized for its odour and as a means of keeping the moths off woollen clothing. Among the Romans we find an allusion to the citron in Virgil's *Georgics*, but it does not appear to have been then yet introduced into Italy, for Columella, long after Virgil's death, made no mention of it, and Pliny, in his paraphrase as it were of the passage of Theophrastus, adds that it had been endeavoured to transport plants of the citron which he calls

malus medica or *malus assyria* into Italy, but without effect, as it would only grow in Media and Persia. Palladius, however, in the fifth century, gives many details of the modes of propagating and cultivating this tree, which he says he had carried on with success on his Sardinian and Neapolitan possessions. It was therefore, in all probability, in the course of the third or fourth centuries that the citron was introduced and established in Italy.

The mass of evidence collected by Prof. Targioni seems to show that *oranges* were first brought from India into Arabia in the ninth century, that they were unknown in Europe, or at any rate in Italy in the eleventh, but were shortly afterwards carried westwards by the Moors. They were in cultivation at Seville towards the end of the twelfth century, and at Palermo in the thirteenth, and probably also in Italy, for it is said that St. Dominic planted an orange for the convent of S. Sabina in Rome, in the year 1200. In the course of the same thirteenth century, the crusaders found citrons, oranges, and lemons very abundant in Palestine; and, in the following fourteenth, both oranges and lemons became common in several parts of Italy. It appears, however, that the original importation of lemons from India into Arabia and Syria occurred about a century later than that of oranges.

The shaddock is believed to have followed a different route in its migration into Europe. Most abundantly cultivated in, and possibly indigenous to, the south-eastern extremity of the Asiatic continent, it is said to have been carried from thence to the West Indies, and from Jamaica and Barbadoes to England early in the eighteenth century. It was, however, certainly previously known in Italy, for it is described and figured by Ferrari, in 1646, as having been sent from Genoa to the garden of Carlo Cadenas, near Naples. There is no record of its first introduction to Genoa, whether from the East or the West.

Innumerable varieties of citrons are cultivated at Florence, where they have ever been great favourites as objects of curiosity as much as for their flowers and fruits. Among them is a very singular one called *bizzarria*, raised by hybridising and cross-grafting, in which the same tree produces oranges, lemons, and citrons, often on the same branch, and sometimes combined into one fruit, a curious case analogous to that of the well-known hybrid by grafting between the *Cytisus laburnum* and *C. purpureus*.

The two last chapters of Prof. Targioni's work are devoted to ornamental trees, shrubs, and herbs of exotic origin, which have,

at various times been introduced into Italy, and are now become more or less common in Tuscany. The list comprises nearly one hundred, but among them there are many which have only been carried there from English gardens in the latter half of the eighteenth century, whose history is of little interest, or may be found in any of our Garden Catalogues, and which are therefore here omitted. It will be sufficient for our present purpose to extract some notes relative to the more important, especially to those which have been so long cultivated in Italy as to have become almost naturalised.

Among them one of the earliest known is the *Oriental Plane-tree* (*Platanus orientalis*), a native of Western Asia, highly prized by the Romans, as we learn from Pliny, for its grateful shade, and celebrated by their most distinguished poets and orators. The same naturalist informs us that it was brought from Asia across the Ionian sea to plant round the sepulchre of Diomedes, in the island named after him, now Pelagosa, one of the Tremiti isles off the Adriatic coast of the kingdom of Naples. Plane-trees were subsequently imported into Sicily, and from thence by Dionysius the First to a garden of his at Reggio in Calabria, whence they spread over the rest of Italy. They were, according to Pliny, brought to the neighbourhood of Rome by a freedman of Marcellus Exerminius in the time of the Emperor Claudius, and have ever since been extensively planted in Italy, where they attain a great age and size.* It is therefore a matter of no small surprise that so many ages should have elapsed before this tree found its way into other European states. It was not known in France until Buffon planted it in the Jardin du Roi in the middle of the eighteenth century; but Clusius had already carried it to Vienna as early as 1576, and in England it had been imported somewhat earlier still by Sir Nicholas Bacon, father of the Chancellor, who planted it in his garden at Verulam in 1548.

The *American Plane* (*Platanus occidentalis*), now become very common in Italy, and generally preferred to the Oriental, was only introduced there long after Tradescant had brought it to England from Virginia about the year 1640.

Another tree, no less celebrated for the beauty of its shade, so valuable a quality in Italian climates, is the *Diospyros lotus*, like

* A plane-tree is mentioned as still existing at Arcoli in 1813, which, from authentic records, was then at least five centuries old.

the plane-tree a native of Asia Minor, but of very early introduction into Italy. It was confounded by ancient Greek and Roman writers with the *Zizyphus lotus*, or with the *Celtis australis*, under the name of *tree lotus*. But those lofty and ancient trees recorded by Pliny, one on the square of the temple of Lucian, another near the temple of Vulcan, and some others near the house of Lucius Crassus, as celebrated for their spreading branches and thick shade, could have been no other than the *Diospyros lotus*, and not the *Celtis* as supposed by some commentators. From having been for ages extensively planted in Italy, and from its readiness to sow itself there, the *Diospyros* has now become naturalised in some localities in such abundance as to induce its insertion in several local floras as indigenous. The American *Persimmon* (*Diospyros virginiana*) with larger fruits, now also to be met with in Italy, was only introduced there from England about the year 1793.

Professor Targioni's notes on the history and geography of the *Cedar of Lebanon* (*Pinus cedrus*) are now superseded by the discussions which have of late occupied some of our most distinguished botanists and horticulturists, and which it would be out of place to enter into on the present occasion. We will merely mention as a curious fact, that a tree, said to have been known to the ancients as of great value, and growing in parts of Western Asia and North Africa, with which the Romans had much intercourse, should never have been planted in Italy till it was carried from England to the Botanic garden at Pisa in the year 1787; that is, above a century after Miller had introduced it into the Apothecaries' Garden at Chelsea, and fifty-three years after Bernard de Jussieu deposited one with so much ceremony in the Jardin du Roi at Paris. The original Pisa tree is now in great beauty, and the species is becoming very generally planted in Tuscany.

The *Cypress* (*Cupressus sempervirens*), generally admitted to be a native of Crete, Syria, and Asia Minor, has for ages been common in Tuscany, where it attains great size and beauty, although individuals of extraordinary dimensions were more frequent in past times in the avenues of seignorial villas than they are at present. The wood was much celebrated by the ancients for its durability. Pliny, as well as modern writers, quotes several instances of its remaining sound for many centuries. We learn from Thucydides that this incorruptibility caused it to be used by the Athenians for the coffins of distinguished

personages, and that the tree was then already considered as an emblem of sorrow and death, whence the ancient custom of planting it in burial-grounds. Recognised as exotic by Pliny, it had however already been introduced into Italy before the time of Cato, who was born in the year 232 B.C. The two remarkable varieties now known, with upright and with spreading branches, were equally distinguished by Pliny.

The *Horse Chesnut* (*Æsculus hippocastanum*), a native of the mountains of Central Asia, was unknown to the ancients. It was first introduced into Constantinople in 1540, whence Qualcebeno, physician to the German Embassy, sent a branch with leaves and fruit to Matthioli in 1557, and it was probably raised at Florence at about that time, for in 1569 Jean Bauhin saw a tree of it about the size of a mulberry in the garden of the Grand Duke Cosmo I. Clusius planted one at Vienna in 1576, and Bachelier introduced it into France from Constantinople in 1615. Two from the same source were planted soon after 1596 at the entrance of the botanic garden at Pisa and attained an immense size. One was destroyed in a storm in 1806, the other still remains.

The *Cherry Laurel*, or common laurel of our gardens (*Prunus laurocerasus*), a native of the Asiatic coast of the Black Sea, is frequent in Italian gardens of comparatively mild climate, for, like many evergreens, it seems more impatient of severe frost there than with us. Unknown to the ancients, it was first brought from Trebizonde to Constantinople about the year 1540, and thence sent by the Austrian Ambassador, David Ugnard, to Clusius at Vienna in the year 1576. From the individuals there raised, it has since spread over the rest of Europe. In Tuscany it was within a very few years of that time procured by Cesalpin, then Professor at Pisa, from the garden of Genoa.

This cherry laurel must not be confounded with the real classical laurel, our bay-tree (*Laurus nobilis*), which is indigenous to Italy and other parts of Southern Europe.

The *Weeping Willow* (*Salix babylonica*), a native of Western Asia, is generally supposed to be the willow of the Euphrates, upon which, as we read in the Bible (Ps. cxxxvii.), the Jewish singers hung their musical instruments. It is not however mentioned by any ancient Greek or Roman writers, nor yet by the Italians of the middle ages, and, common as it now is all over Europe, it does not appear in any catalogue of Italian gardens until that compiled by Micheli, in 1715, of the botanical gardens of Florence. It is however clearly represented

by Benvenuto Cellini on a basin in the Royal collection at Florence, executed in the sixteenth century, but whence that artist derived his models is unknown.

The *Pride of India* (*Melia azedarach*), now common in Southern Europe, is an East Indian tree, first brought into Italy from the Levant in the sixteenth century, as it is supposed, by the Franciscan friars. It was then chiefly planted about convents, the perforated kernels being used for making paternoster chaplets. It is first mentioned in Tuscan catalogues in 1635.

The *Julibrissin* (*Albizzia julibrissin*), a favourite ornamental tree in Southern Europe, as well as in Northern Africa, the Levant, and East India, is a native of the mountains of Central Asia, from the Caucasus to China. It was first brought into Italy from Constantinople in 1749, by the Cavaliere Filippo Albizzi, to whom Durazzini dedicated the genus he founded upon it, which has been adopted by botanists since the last revision of the *Mimosas* of Linnæus.

The *Lilac* (*Syringa vulgaris*) is supposed to be a Persian shrub, introduced into Europe about the year 1597. It was, however, certainly in the botanical garden at Padua before 1577, for Matthioli, who died in that year, tells us he had received a fresh specimen in flower from Cortusa, then director of the Padua garden, during the time that he was finishing his commentary on Dioscorides. The small-leaved *Persian lilac* (*Syringa persica*) is of still more recent introduction, and said to come from the same country. We are not aware of any really wild specimens of either species having been deposited in our herbaria, or having been actually met with by modern travellers, but we should be inclined to believe that the common lilac is but a luxuriant variety of the Persian produced by cultivation, and the more so as some intermediate forms known by the names of *lilas varin*, &c., have been raised from seeds of the latter. The Transylvanian *Syringa Josikæa*, now occasionally to be met with in gardens, is a perfectly distinct scentless species.

Hibiscus syriacus, the *Althæa frutex* of our gardens, of Syrian origin, as its name implies, has become naturalised in the hedges of some parts of Northern Italy. The precise date of its introduction is unknown, but it certainly had already been for some years in Florentine gardens previous to 1596, the period assigned for its introduction into England.

Amongst the North American trees, more or less generally established in Italy, Professor Targioni enters into some details

respecting the following species: the *Acacia* or *Locust-tree* (*Robinia pseudacacia*), the *Tulip-tree* (*Liriodendron tulipiferum*), the *Magnolia* (*Magnolia grandiflora*), the *Black Walnut* (*Juglans nigra*), the *Negundo Ash* (*Negundo fraxinifolia*), the *Deciduous Cypress* (*Taxodium distichum*), the *Gleditschia triacanthos*, *Bignonia Catalpa*, *Pyrus coronaria*, and *Juniperus virginiana*. They all succeed remarkably well in Italian climates, to which they had been introduced at various periods during the course of the eighteenth century.

The *Casse* or *Cassis* of French perfumers (*Acacia farnesiana*), of South American origin, is much cultivated in Southern Europe for ornament, and in some localities for the extraction of the essence from its flowers. It is so generally spread over the hotter regions of both hemispheres, that it has been recorded as indigenous to many parts of the Old World, as well as of America; and some of the most careful observers among modern East Indian botanists, seeing it so abundant in parts of the peninsula at considerable distances from the haunts of Europeans, have felt convinced that it was a real denizen. Yet there are many circumstances which induce us to come to the conclusion that it has only become naturalised after cultivation. It has ever found much favour with the Arabs and other Mahometan races, and sows itself with remarkable facility, and it is most frequently found in India around villages. On the other hand it is an undoubted native of the West Indies and of South America, and was never known in the Mediterranean region until introduced from thence. We are told that the first seeds were raised at Rome in 1611, in the garden of Cardinal Odoardo Farnese, having been imported direct from St. Domingo, and that from the issue of these plants it subsequently spread over Southern Europe. It is not stated whether it may not also have been at an early period brought over from South America by the Spaniards.

Schinus molle, commonly but improperly called the *pepper-tree*, was certainly first introduced by the Spaniards from Chili or Peru before the year 1570, when a fruiting branch was sent to Clusius from Spain. It is now very common in Southern Italy, but less so in Tuscany, where it is often injured by the winter frosts.

Among Eastern trees introduced into Italy through France or England in the course of last century, the *Broussonetia papyrifera*, *Ailanthus glandulosa*, *Sterculia platanifolia*, and *Ginkgo biloba*

(commonly called in this country *Salisburia adiantifolia*), are not unfrequently to be met with in Southern Europe; and the *Camellia*, first cultivated in Italy in the Caserta garden, near Naples, in 1760, is now a great favourite in Tuscany, where, in sheltered situations, it will attain great size and beauty in the open air.

The common *Roses* of Italian gardens are none of them indigenous, but the native country and precise form of the wild type of most of them is involved in much uncertainty. The most anciently and generally cultivated one, the common *Cabbage Rose* (*Rosa centifolia*), is that which is the most generally alluded to by poets and other writers, from the days of Virgil and Pliny, to our own times. It is also much cultivated in Southern Europe for the use of perfumers. It is said to have been brought from Persia into Greece and Italy in very remote times. The *Provence Rose* (*Rosa gallica*) is found wild in France and Germany, but whether indigenous or not, is uncertain. It is believed to have been referred to by Pliny, under the names of *Rosa prænestina*, *carthaginensis*, and *milesia*. The *Damask Rose* (*R. damascena*), and the common *White Rose* (*R. alba*), are also believed to have been among those enumerated by Pliny, and to be natives of Southern Europe, though not of Italy. The *Rosa moschata* appears to have been introduced from the Levant in the sixteenth century. The climbing roses now forming so beautiful a feature in Italian promenades and gardens (*Rosa indica*, *R. Banksiana*, and *R. multiflora*), are of very recent importation from French and English gardens, as none of them appear to have been known in Italy before the commencement of the present century.

From the latter end of the sixteenth century, there arose in various parts of Italy, especially at Florence, a great rage for the cultivation of innumerable varieties of *Anemones* (*A. coronaria*), *Ranunculus* (*R. asiaticus*), *Hyacinths* (*H. orientalis*), *Tulips* (*T. Gesneriana*), and *Narcissus* (*N. poeticus*). The wild types of most of them, perhaps of all except the *ranunculus*, are to be found in Italy and Greece as well as in the Levant, but the production and cultivation of the garden varieties of all of them commenced in the East. They were all introduced into Western Europe from Constantinople at various periods between the years 1550 and 1600, together with the *Crown Imperial* (*Fritillaria imperialis*), said to be a native of Persia, the *Muscari moschatum* from the shores of the Bosphorus, the *Lilium chalcedonicum* from the Levant, which had all been then for some time in Constanti-

nopolitan gardens. Of all the above-mentioned flowers, the anemone and narcissus alone can be recognised under those names in the writings of the ancient Romans, for the various hyacinths of Virgil and Pliny were evidently very different from the plant we give that name to.

The *Tuberose* (*Polyanthes tuberosa*) is generally said to be a native of East India, Java, and Ceylon, but it is there everywhere cultivated, as it is also in almost every South American garden, and its origin is very uncertain. Judging from the localities of its nearest allies in the genera *Agave* and *Beschorneria*, we should consider some part of the Mexican empire as its most probable fatherland, and that it was carried to Europe and to Asia very early after the conquest of that territory. It was known to Clusius at Vienna, in 1594. Rumphius tells us that it was introduced into Amboyna, in 1694, from Batavia, where it was very common, meaning probably in gardens there. He also tells us that the Italian ones were the most esteemed in India. Yet in Italy tuberose were still very scarce in the beginning of the eighteenth century.

The *Jessamine* (*Jasminum officinale*), a native of East India, now as it were naturalised in some parts of Italy, is believed to have passed from East India into Arabia, thence into Egypt, and lastly, in the middle ages, into Italy. It appears to have been unknown to the ancient Greeks and Romans, for the references made to it by some commentators are evidently erroneous. The first mention of it in Italy is in a poem by Rucellai, written about 1524, where it is spoken of as a new flower unknown to the ancients. Matthioli, about 1559, also tells us it had not been long imported into Italy, although it was then already common in every garden. The *Jasminum grandiflorum*, a mere variety of the common one and very abundant in India in the wild state, was imported from Spain in the sixteenth century, and the *Mugherino* or *Sambak* (*Jasminum Sambak*), direct from Goa in the seventeenth.

Carnations (*Dianthus caryophyllus*) are first recorded as having been cultivated by King René of Anjou and Provence, at Aix, in the thirteenth century, but whether there raised or imported from more southern climates does not appear. The wild type is common in Southern Europe, but with flowers of such very reduced dimensions that we must presume a period of several ages requisite to produce those splendid varieties now in cultivation.

In the latter half of the sixteenth or in the early years of the

seventeenth century, a considerable number of South American plants were introduced into Italian gardens either direct from Brazil, Mexico, or Peru, or through the Spaniards. Among those which speedily became generally cultivated, we may mention the *Sunflower* (*Helianthus annuus*), from Mexico or Peru; the *Nasturtium* (*Tropæolum majus*), the *Marvel of Peru* (*Mirabilis Jalapa*), and the *Quamoclit* (*Ipomœa Quamoclit*), from Peru; and the *Passion-flower* (*Passiflora cærulea*), from Brazil. *Dahlias*, from Mexico, and *Fuchsias*, from Peru, were not imported till the close of the eighteenth century. The East Indian *Chrysanthemums*, the Japanese *Hydrangeas*, and the Cape *Pelargoniums*, all well-established in Italian gardens, were brought there from England or France at the close of the last or the commencement of the present century.

Having thus passed in review the long list of plants generally cultivated in Tuscany, whose history is investigated by Professor Targioni-Tozzetti, it remains for us to express our regret that our limited space has prevented our entering into numerous interesting details, for which we must refer to the work itself, as well as for the authorities upon which they are founded, which are carefully given on every occasion. They show a vast amount of patient research, and supply a body of facts and references which it will be necessary for every one to consult who interests himself in this branch of botanical history and geography. We must also express our obligations to the several botanists recently returned from long and active explorations of Northern and Western India, whose important observations and enlightened views have materially assisted us in the investigation of the wild types of cultivated species of real or supposed Asiatic origin.

By some transposition of words at page 137 of this Vol. we are made to say, that the sugar-cane was brought from the West Indies in the time of the Saracens. It was introduced both to the West Indies and to Southern Europe from Asia.

REPORT FROM THE COUNCIL

TO THE

ANNIVERSARY MEETING, MAY 1, 1854.

At the last Anniversary the Council had to report that the debt of the Society had been increased by the sum of 121*l.* 16*s.* 5*d.* It is their duty now to state that, although the income of the Society has improved, yet an addition has been unavoidably made to the debt of 162*l.* 14*s.* 8*d.*

The Debt on April 1, 1853, was . . .	£7408	8	2
Since diminished by Compositions, to the extent of	367	10	0
	<hr/>		
	£7040	18	2

But the Ordinary Income having been less than the Expenditure by the sum of 530 <i>l.</i> 4 <i>s.</i> 8 <i>d.</i> , that sum has to be added to the Debt	530	4	8
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Making the Debt on April 1, 1854 . . .	£7571	2	10
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Showing a Balance against the Society upon the Year
of 162*l.* 14*s.* 8*d.*

On the other hand, they are able to announce the reduction of the interest upon the Society's loan notes from five to four per cent.; the discontinuance of an allowance of 60*l.* a year to the late Mr. Munro, and an increase in the rents receivable from the tenants of the House in Regent Street.

The balance sheet as signed by the Auditors is as follows:—

HORTICULTURAL SOCIETY OF LONDON.

RECEIPTS, PAYMENTS, AND LIABILITIES, FROM THE 1ST OF APRIL, 1853, TO THE 31ST MARCH, 1854.

RECEIPTS.		PAYMENTS AND LIABILITIES.	
£	s. d.	£	s. d.
To compositions for life from Fellows	367 10 0	By interest on loan notes, &c.	
To annual subscriptions do.	2564 12 0	By rents, taxes, &c., Regent Street and Chiswick	267 17 8
To admission fees do.	84 0 0	By repairs, furniture, &c., Regent Street	215 13 0
To Quarterly Journal sold	38 17 0	By housekeeping expenses, do.	106 13 4
To Transactions and Fruit Catalogues sold	13 18 6	By salaries and wages, collector's poundage, &c.	46 9 5
To rents of apartments let off in Regent Street	135 0 0	By cost of Quarterly Journal	763 17 8
To garden produce sold	34 13 4	By cost of Transactions and Fruit Catalogues	219 1 11
To receipts from Fellows for garden charges	26 5 0	By library charges	24 11 9
To miscellaneous receipts	17 4 6	By printing, stationery, &c.	9 4 6
To Garden Exhibitions, 1853.	3633 19 6	By foreign missions and imports	40 9 0
		By expenses of meetings, postage, carriage, &c.	12 1 4
		By garden labour	86 15 1
		By implements, mats, seeds, &c.	1387 4 10
		By fuel, dung, &c.	86 4 6
		By coals and coke for garden	35 18 0
To Sir W. P. Call & Co. on loan	1400 0 0	By miscellaneous expenses at garden	128 14 4
		By garden repairs	125 13 8
		By distribution expenses	34 0 8
To Balance at Banker's, April 1, 1853.	£ s. d.	By Exhibition expenses, 1853	49 7 1
do. with Vice-Secretary	163 1 2	By new works at garden	866 5 8
	23 2 3	By outstanding accounts, April 1, 1853.	349 16 8
			783 1 5
		By melals' account:—	
		Balance outstanding, April 1, 1853.	£ s. d.
		Awards, &c., since	219 3 6
			1055 15 0
			£1374 18 6
		By Sir W. P. Call & Co., Loans, April 1, 1853, repaid	1104 2 6
		By Loan notes paid off	1000 0 0
			400 0 0
		By Balance at Banker's	
		do. with Vice-Secretary	£201 12 4
			17 3 11
			218 16 3
			£302 3 3

GEORGE CHARLWOOD, } Auditors.
JOHN C. STEVENS, }

A. DUNCAN, Accountant,
10, TRENCHARD YARD.

Amount of Debt 1st April, 1854, viz.:—
To Creditors on Loan Notes
To Sir W. P. Call & Co., on Loan
To Liabilities, as above

Less Cash Balance
Amount of Debt 1st April, 1853
Addition to Debt since 1st April, 1853

The items in the foregoing document, relating merely to income and expenditure, are as follows:—

A RETURN OF THE INCOME AND EXPENDITURE OF THE HORTICULTURAL SOCIETY, FOR THE YEARS 1852-3 AND 1853-4.								
INCOME.			1852-3.			1853-4.		
	£	s.	d.	£	s.	d.		
Annual Subscriptions	2685	1	8	2364	12	0		
Admission Fees from Fellows	75	12	0	84	0	0		
Quarterly Journal sold	80	16	3	38	17	0		
Transactions and Fruit Catalogue sold	9	18	0	13	18	6		
Rent of Apartments let off in Regent-street	150	0	0	135	0	0		
Garden Produce sold	25	11	1	34	13	4		
Receipts from Members for Garden charges	28	18	0	26	5	0		
Miscellaneous Receipts	34	1	10	17	4	6		
Garden Exhibitions	3225	14	6	3633	19	6		
Total	6315	13	4	6348	9	10		
EXPENDITURE.			1852-3.			1853-4.		
	£	s.	d.	£	s.	d.		
Interest on loan notes, &c.	280	8	5	316	8	6		
Rent, taxes, &c., Regent Street and Chiswick	645	0	3	645	7	10		
Repairs, furniture, &c., Regent Street	92	4	11	114	6	1		
Housekeeping expenses ditto	41	5	0	46	9	5		
Salaries and wages, collector's poundage, &c.	969	15	9	892	19	9		
Cost of Quarterly Journal	301	2	1	308	17	6		
Cost of Transactions and Fruit Catalogues	13	14	3	24	11	9		
Library charges	18	5	4	16	16	6		
Printing, stationery, &c.	73	6	9	48	18	0		
Foreign missions and imports	5	0	9	12	1	4		
Expenses of meetings, postage, carriage, &c.	98	5	1	86	15	1		
Garden labour	1329	3	0	1387	4	10		
Implements, mats, seeds, &c.	99	14	0	95	15	9		
Tan, dung, &c.	34	15	2	35	18	0		
Coals and coke for Garden	153	9	9	158	14	4		
Miscellaneous expenses at Garden	115	12	5	125	13	8		
Garden repairs	130	18	10	86	17	7		
Distribution expenses	120	13	10	119	18	10		
Exhibition expenses	1029	0	10	942	16	11		
New works at Garden	158	13	4	356	7	10		
Cost of medals awarded	1299	5	0	1055	15	0		
Total	7009	14	9	6878	14	6		

It appears from the foregoing return, that the ordinary income of the Society has increased by the sum of 32*l.* 16*s.* 6*d.*, and that the entire expenditure has diminished to the extent of 131*l.* 0*s.* 3*d.*

making the financial position better, in this point of view, than in 1853, to the extent of 163*l.* 16*s.* 9*d.* Doubtless it would have been in the power of the Council to augment this improvement by the discontinuance of all attempts to improve the property and increase the efficiency of the Society. But on the one hand, they did not feel justified in delaying the repair of the house in Regent Street, which had long been necessary, and on which a sum of 84*l.* has now been expended; and on the other, the state of the Arboretum and its approaches called for improvement, which had in fact been decided upon in 1852, but was arrested by the incessant rains of that year and the following. At a cost of 149*l.* 18*s.* 2*d.* extensive alterations have been effected; the American garden has been connected with the Arboretum, the beds of Rhododendrons have been wholly remodelled, a large portion of the turf has been raised and relaid, and such changes in the level of the surrounding ground as attention to effect demanded have been carried out. A new roof has been also fixed upon the great iron Tent, and the glass wall, erected by Mr. Pilkington, has been purchased on very advantageous terms. Altogether these expenses have amounted to 356*l.* 7*s.* 10*d.* The ordinary garden disbursements of the Society have moreover been unexpectedly increased by the high price of coals, and by the necessity of advancing the wages of the labourers in the Garden, in order to enable them to meet the general rise in price of food and fuel. It is to be expected that the last-mentioned source of expense is merely temporary.

Passing from the subject of expenditure to that of income, the Council have to advert to the fact, that although there has been on the whole an increase of income, and although the present year's account is decidedly better than the last, yet the receipts from annual subscriptions appear less by the sum of 320*l.* 9*s.* 8*d.* This is principally owing to a large amount of arrears outstanding having been collected during the previous year, and which has left a smaller amount to be received this year; but partly also to a diminution in the number of Fellows from deaths, resignations, removals, and life subscriptions. The number of elections this year has been forty-one, against thirty-eight in 1852-3, and the loss of members from all causes has been forty-nine against sixty; so that here also an improvement is manifested. But it is evident that unless the elections exceed the losses from death, resignation or removal taken together, this part of the revenue must be expected to diminish. The Fellows of the Society are

therefore urged to exercise their individual influence, in proposing new Fellows for election. Such co-operation affords the readiest means of enabling the Council to maintain the Society in a permanent state of efficiency. They would further add that the forty-one elections that have this year taken place, were upon the recommendation of only twenty-seven Fellows.

The Admission fee being only 2*l.* 2*s.* 0*d.* and the Annual Subscription not being in advance, every facility is given to candidates for admission, and the Council are persuaded that if this were more extensively known, it may be expected that our numbers will again increase, especially when the solid advantages connected with the Fellowship of the Society are better appreciated.

From the mere distribution of plants and seeds, no inconsiderable advantage is derived, as is shown by the following return.

NUMBER OF PLANTS, &c., GIVEN AWAY BY THE SOCIETY FROM MARCH 31, 1853, TO MARCH 31, 1854.			
	Plants.	Seeds.	Cuttings.
To Members	4,401	50,510	1,331
To Foreign Countries, Correspondents, &c.	357	687	314
To Her Majesty's Colonies.	—	214	60
Total	4,758	51,411	1,705

When it is considered that the distribution of such articles is necessarily governed by the general principle that nothing shall be propagated which can be procured readily among nurserymen, it will be seen that these figures represent a considerable amount of value. The increasing demands made for Kitchen Garden and other seeds, which are procured from the Continent and given away as samples of what esculents of the finest quality should be, attest the advantage that is derived from the continual dispersion of such articles through the country. The Council believe that the propagation of novelties in the Garden is more successful now than it has ever been before, the organisation of the distribution department having been greatly improved of late years; and they anticipate largely increased activity in this department as soon as the collections to be made in Mexico by Mr. Botteri, now engaged in the service of the Society, shall have begun to arrive in England.

Many unforeseen circumstances detained this gentleman in Dalmatia much longer than was anticipated. When he undertook

the office of collector he was residing in the island of Lesina, where he held an employment under the Austrian Government; time was required to arrange his official engagements, and to prepare for an absence of uncertain duration in a distant country. The consequence was that Mr. Botteri only reached England a few weeks ago. The Council are now able to report that he took his departure for Liverpool some days since, and has probably sailed for Vera Cruz. His first consignments may therefore be expected in the autumn. In connection with this part of their Report, the Council desire to express their obligations to the house of Messrs. Antony Gibbs and Co., for providing Mr. Botteri with letters of credit on Mexico.

The Council have to record their disappointment at the supplies of Coniferous and other seeds expected from Real del Monte not having reached England. The cause of this delay is unknown, but it is hoped they may arrive in the course of the present summer. Nor has any such advantage as was anticipated been derived from the Society's subscription to the Scotch expedition to Oregon formerly reported. The collections made by Mr. Jeffreys have given so little satisfaction that the Committee under whom he acted have announced his recal. The Council must at the same time declare that the Horticultural Society has been treated by the Oregon Committee with the utmost possible liberality.

The plan of effecting Life Subscriptions upon the scale authorised Feb. 17, 1852, has been taken advantage of by 3 Fellows only, viz:—

	£	s.	d.
By Arthur Currie, Esq., after paying 20 years' sub- scription, by further payment of	21	0	0
By James Malcolmson, Esq., after paying 21 years' subscription, by further payment of	21	0	0
By Richard Davis, Esq., after paying 7 years' sub- scription, by further payment of	31	10	0
	<hr/> £73 10 0		

The Exhibitions in the Garden shew a marked improvement, the value of the tickets sold having increased to the extent of 40*l.* 5*s.* beyond that of 1852-3, while the expenses have been diminished by 337*l.* 13*s.* 11*d.*

The following return shows under what heads the expenses have been distributed, and in what way those of 1853 differ from those of 1852:—

EXPENSE OF EXHIBITIONS.	1851.			1852.			1853.		
	£	s.	d.	£	s.	d.	£	s.	d.
1. Miscellaneous timber	27	3	8	18	7	7	9	11	10
2. Miscellaneous repairs	39	0	6	45	13	4	30	2	0
3. Carpenters, painters, tent-pitchers, &c.	121	10	11	140	2	5	118	2	3
4. Miscellaneous labour beyond the ordinary service of the Garden									
5. Miscellaneous printing	64	17	10	59	17	4	56	7	0
6. Admission tickets	30	14	0	25	7	0	23	5	0
7. Advertisements	125	4	6	119	1	0	104	1	6
8. Judges	31	10	0	31	10	0	34	13	0
9. Extra clerks and temporary rooms	22	16	0	24	0	0	28	11	6
10. Police	81	9	0	71	12	0	76	13	0
11. Bands and all musical expenses	300	0	0	270	0	0	270	10	0
12. Provisions for exhibitors, police, &c.	56	0	11	56	16	10	61	13	7
13. Watering roads	15	15	0	15	15	0	10	10	0
14. Miscellaneous expenses, including stationery, carriage, postage, &c.	48	3	0	41	4	8	40	19	3
15. Cost of new tents									
16. Green baize for tables	46	3	9	5	0	0	—	—	—
Medals awarded	1145	6	6	1029	0	10	942	16	11
	1033	5	0	1227	0	0	*975	10	0
	2178	11	6	2256	0	10	1918	6	11

The number of tickets sold at 3s. 6d. diminished by 605, those at 5s. increased by 1926, and those at 7s. 6d. also increased by 87. The total number of tickets sold in 1853 was 1408 more than in 1852. The number of persons attending, exclusive of Exhibitors and the Garden staff, was,

	In 1852.	In 1853.
May	2755	2381
June	4719	7044
July	8820	7225
	16,294	16,650

It will be seen from this how much the coldness of our springs continues to affect the presence of visitors in May.

In settling the details of the Exhibitions now about to take place, it has been found necessary to introduce some important changes. Representations were more especially made to the

* This is part of the sum of 1055*l.* 15*s.* entered in the balance-sheet as Medals awarded—the balance of 80*l.* 5*s.* being for Awards at Meetings in Regent Street.

Council that the value of the prizes no longer corresponded sufficiently with the expenses incurred by Exhibitors; that the difference in value among the prizes was now too great, there being much less difference in the merits of competitors than formerly existed, and that a better graduated scale of prizes was required. The Committee appointed to consider these and similar representations was especially instructed to make such arrangements as should appear most conducive to the general interests of Horticulture.

The Committee recommended that the scale of prizes should be better graduated, and proposed the following plan.

IN FUTURE			INSTEAD OF		
	£	s.		£	s.
LG 1.—First Large Gold Medal	15	0	LG. Large Gold Medal	15	0
LG 2.—Second Large Gold Medal	12	0			
GK 1.—First Gold Knightian Medal	10	0	GK. Gold Knightian Medal	10	0
GK 2.—Second Gold Knightian Medal	8	0			
GB 1.—First Gold Banksian Medal	7	0	GB. Gold Banksian Medal	7	0
GB 2.—Second Gold Banksian Medal	5	0			
SG. —Silver Gilt Medal	4	0	SG. Large Silver Gilt Medal	4	0
LS. —Large Silver Medal	3	0	CE. Certificate of Excellence	2	10
SK. —Silver Knightian Medal	2	0	LS. Large Silver Medal	1	15
SB. —Silver Banksian Medal	1	0	SK. Silver Knightian Medal	1	5
C1. —First Certificate	0	15	SB. Silver Banksian Medal	1	0
C2. —Second Certificate	0	10	C. The Certificate of Merit	0	10
	68	5		43	0

thus raising the whole value of the scale from 43*l.* to 68*l.* 5*s.* 0*d.*

But as this change has the effect of largely increasing the amount that may be awarded in any class, it became necessary to alter the classes themselves, omitting some articles of exhibition altogether, so as to provide by such exclusion the funds required for the augmentation of the prizes in other classes. The Committee believe that this has been so effected that the amount for which the Society is made liable for Medals, &c., in 1854 is not essentially different from that of 1853.

The number of tickets which each Fellow should be privileged to purchase at 3*s.* 6*d.* has been the subject of discussion on former occasions. Originally it was twenty-four; in 1851, the year of the Great Exhibition in Hyde Park, it was increased to forty-eight; and the same number was allowed in 1852 and 1853. It has been suggested that the number should be even unlimited. Experience has however shown, that even forty-eight is a larger issue than is advantageous financially.

In 1850, when twenty-four only were issued, the sale of 3*s.* 6*d.* tickets was as 7644 to 10,389 of the others. When forty-eight were allowed, the numbers were as follows :—

1851	13,405	to	10,227
1852	10,102	to	5,317
1853	9,497	to	7,330

Thus it appeared that while the proportion between 3*s.* 6*d.* tickets and other tickets was as seven to ten where twenty-four only were allowed, the proportion became reversed from the moment when the number was extended to forty-eight, the numbers in the three years during which the trial lasted having been as thirteen to ten, ten to five, and nine to seven. This appeared to be so manifestly detrimental to the finances of the Society, that it has been thought expedient to reduce the number of privileged tickets from forty-eight to thirty-six for the ensuing year.

It is satisfactory to add that the meetings in Regent Street have been unusually well attended. The introduction of subjects connected with the collateral branches of Horticulture has proved interesting, especially those of which utility, not mere beauty, is the principal feature. It is therefore hoped that the produce of plants cultivated for the sake of their value in arts and manufactures, whether at home or abroad, will continue to be brought forward by those who possess information concerning them. Colonial as well as home produce is admissible to Exhibition, and if it should hereafter appear desirable to do so, the Council are prepared to authorise the award of medals to such subjects as well as to the more usual descriptions of horticultural produce.

The following return shows the number of Medals awarded in Regent Street from April 1, 1853, to April 1, 1854 :—

1. FLOWERS.		2. FRUITS.	
2 Large Silver Medals.		2 Knightian Medals.	
6 Knightian Medals.		18 Banksian Medals.	
12 Banksian Medals.		25 Certificates of Merit.	
22 Certificates of Merit.		—	
—		45	
42			
		3. VEGETABLES.	
		3 Knightian Medals.	
		7 Banksian Medals.	
		7 Certificates of Merit.	
		—	
		17	

In the course of the year Mr. Robert Thompson, the superintendent of the Orchard and Kitchen Garden department, has

prepared a supplement to the Society's Fruit Catalogue, which has appeared in the Journal.

The Council continue to receive numerous valuable contributions to the Garden, among which they have most especially to notice large supplies of American and other hardy plants, presented by Mr. Dancer of Fulham, Mr. Osborne of Fulham, Mr. Cunningham of Liverpool, Mr. Groom of Clapham, and Mr. John Waterer of Bagshot, in aid of the alterations in the Arboretum already alluded to. Without such extensive assistance the work could not have been executed, except at a largely increased cost to the Society.

Among those presents which more particularly claim a record here are the following;—

From G. U. Skinner, Esq., 15 sorts of Seeds and some Bulbs from Teneriffe; pieces of various newly imported Orchids, including *Barkeria spectabilis*, and *Barkeria Skinneri*; two very large plants of *Sobralia macrantha* and *Cyrtopodium punctatum*.

From E. A. Brande, Esq., Seeds of *Glycine sinensis alba* and two other sorts of Seeds from China.

From The Lord Wharnccliffe, *Posoqueria longiflora* and 16 other Plants, Seeds of Wild Coffee from Grenada.

From James Warren, Esq., of 96, Houndsditch, a quantity of Assam Tea Seed.

From M. André Leroy, of Angers, Cuttings of 33 sorts of Pears, 5 of Apples and 1 Plum; and plants of 3 sorts of Grape Vines.

From The Honourable Court of Directors of the East India Company, various living plants, 36 sorts of Seeds from Kooloo, and a large quantity of other Seeds from different parts of India, including *Berberis Leschenaulti*, and varieties of Indian Balsams.

From M. Vilmorin, of Paris, Plants of 3 sorts of new Strawberries, 2 of Fruit-trees, and a quantity of Ornamental Flower Seeds.

From G. T. Davy, Esq., 18, Sussex Square, Hyde Park, Roots of *Tropæolum azureum* and *Tropæolum tricolorum*.

From the Garden of the Worshipful Company of Apothecaries at Chelsea, *Brillantaisia owariensis*, *Begonia margaritacea*, and 23 other plants.

From Dr. J. E. Stocks, Superintendent of the Botanic Garden, Dapooree, Poonah, Bombay, 10 sorts of Indian Seeds.

From H. Houghton, Esq., Friday Street, City, 10 varieties of Orchids from La Guayra.

From Dr. Maclean, of Colchester, Roots and Seeds of his Seedling *Tigridias*.

From Mr. Fowke, a plant of *Rhododendron Hursleyanum*.

From R. Trevor Clarke, Esq., a plant of an Hybrid *Begonia*.

From James Bateman, Esq., a plant of *Sobralia macrantha*.

From His Excellency Lord Harris, Trinidad, a Wardian Case, containing 22 living plants.

From M. Weddell, of Paris, Seeds of *Cinchona ovata*, and 3 other sorts of Seeds from Bolivia.

From Mr. Francis Rauch, Belvidere, near Vienna, Seeds of *Abies Apollinea*, and *Pinus halepensis*.

- From Mrs. M'Adam Cathcart, a plant of the Green-flowering Primrose.
 From Edward Delius, Esq., of Malaga, a bag containing 3 quarts of Seed of *Abies Pinsapo*.
 From Isaac Anderson, Esq., of Edinburgh, a species of *Melastoma* and 11 other plants from the Andes.
 From Mr. James Duncan, Botanic Garden, Mauritius, two Wardian Cases, containing *Ochna Madagascariensis*, *Stravadium rubrum*, *Phyllarthron Comorense*, and 54 other plants.
 From Sir W. C. Trevelyan, Bt., Seeds of *Trichosanthes palmata*.
 From John Ferne, Esq., of Haddington, 20 sorts of Seeds from Caffaria.
 From James Leech Ridgway, Esq., of 169, Piccadilly. Seeds of 4 varieties of *Nelumbium*, and 4 of *Nymphæa*.
 From H. C. Calvert, Esq., of Erzeroum, a collection of Seeds collected in the neighbourhood of Erzeroum.
 From A. Murray, Esq., Seeds of *Pinus macrocarpa*, and 2 sorts of Acorns.
 From Capt. George Elliott, R. Marines, 5 sorts of Seeds, and 5 of Acorns from Asia Minor.
 From Capt. Vetch, R.N., Seed of *Abies religiosa*.
 From Dr. Asa Gray, roots of *Tipularia discolor*.
 From E. W. Mark, Esq., of 12, Upper Eccleston Place, Eccleston Square. Seed-heads of a plant called "La Bellissima."
 From Mr. Thomas Long, of Kilmarnock, a plant of *Salix Caprea pendula*.
 From Mr. R. Glendinning, a large plant of *Araucaria imbricata*.
 From Mr. Hugh Low, *Lapageria rosea*, *Cupressus australis*, and 4 other plants.
 From Mr. R. T. Pince, a plant of *Begonia Prestonensis*.
 From Messrs. Weeks & Co., Seeds of a Water Lily from Santa Martha and various other Seeds.
 From Mr. John Waterer, of Bagshot, Plants of six *Rhododendrons*.
 From Mr. Henry Groom, a quantity of *Lilium Bulbs*.
 From Mr. George Cunningham, 31 young Hybrid *Rhododendrons*.
 From Mr. Alexander Dancer, Plants of 60 sorts of *Rhododendrons*, 45 sorts of Hardy Azaleas, and *Abies Jesoensis*.
 From Messrs. Osborne, *Andromeda speciosa*, and 23 other hardy Ornamental Plants.
 From Mr. W. J. Epps, Plants of 24 new Greenhouse Azaleas, and *Begonia xanthina*.
 From Messrs. Minier & Co., 15 sorts of Kitchen Garden Seeds.
 From Messrs. Peter Lawson & Son, Seeds of *Pinus Sabiniana*.

In this manner the efficiency of the Garden is greatly promoted without recourse to the funds of the Society.

The number of visitors to the Garden during the year has been 6573, or 642 more than in 1852-3.

From what has now been stated the Council venture to believe that if the pecuniary position of the Society is not so brilliant as in some former years when it was their pleasing office annually to announce a large excess of income over expenditure, yet that it is in a state of decided improvement, which they trust to be able

next year to say has undergone further advance. The Fellows may be assured that this fundamental subject receives constant attention ; and that the Council feel it to be their first duty to consider what measures are most likely to be useful to the Fellows, attractive to the public, and of solid value in promoting the great objects for which the Horticultural Society of London was incorporated.

ORIGINAL COMMUNICATIONS.

XIV.—AN ABSTRACT OF METEOROLOGICAL OBSERVATIONS IN THE GARDEN OF THE SOCIETY: in continuation of those published vol. vii., p. 138. By Robert Thompson.

1852.

	THERMOMETER.			RAIN.	BAROMETER.			Mean Mois- ture.
	Max. in Sun.	Min. by Radiator.	Mean of Shaded Therm.	In pts.	Max.	Min.	Mean.	
January . . .	59	13	39·66	2·72	30·326	29·022	29·717	988
February . . .	62	11	38·72	1·06	30·637	29·111	29·967	931
March . . .	78	8	39·62	0·25	30·739	29·200	30·127	833
April . . .	95	12	44·81	0·52	30·326	29·546	30·073	760
May . . .	87	18	51·45	1·74	30·240	29·569	29·899	810
June . . .	85	37	58·01	4·69	30·075	29·214	29·687	895
July . . .	120	43	67·61	2·27	30·158	29·640	29·970	830
August . . .	102	42	63·67	3·71	30·260	29·123	29·758	886
September . .	103	31	56·21	3·64	30·462	29·179	29·867	928
October . . .	91	25	46·22	3·87	30·451	28·877	29·824	948
November . .	71	20	47·38	6·20	30·164	28·848	29·553	980
December . .	60	24	46·56	1·97	30·259	28·983	29·672	991
Means . . .	84·41	23·66	49·99	32·64	30·341	29·192	29·842	898

GEOTHERMOMETRICAL OBSERVATIONS.

1852.		Day of the Month.	TEMPERATURE OF THE EARTH.		Day of the Month.	TEMPERATURE OF THE AIR.		Day of the Month.	Monthly mean Tempera- ture of the Air.
			1 Foot.	2 Feet.		Day.	Night.		
JAN.	{ Max.	16 th	45°	43°	15 th	56°	44°	15 th	39°66
	{ Min.	2 nd	37°	38°	1 st	35°	20°	4 th	
	{ Mean	—	40°06	39°77	—	48°00	31°32	—	
FEB.	{ Max.	6 th	46°	43°	1 st	57°	44°	4 th	38°72
	{ Min.	21 st	36°	38°	20 th	38°	15°	20 th	
	{ Mean	—	40°10	39°73	—	47°20	30°24	—	
MAR.	{ Max.	31 st	44°50	42°	22 nd	66°	45°	30 th	39°62
	{ Min.	7 th	35°50	36°	18 th	44°	15°	4 th	
	{ Mean	—	39°13	38°89	—	50°61	28°64	—	
APRIL.	{ Max.	30 th	49°	45°	14 th	73°	50°	29 th	44°81
	{ Min.	4 th	41°50	41°	19 th	48°	20°	19 th	
	{ Mean	—	44°51	43°56	—	57°63	32°00	—	
MAY.	{ Max.	20 th	55°	53°	16 th	74°	51°	13 th	51°45
	{ Min.	3 rd	45°	46°	2 nd	51°	25°	2 nd	
	{ Mean	—	51°42	49°30	—	61°61	41°29	—	
JUNE.	{ Max.	26 th	60°50	58°	24 th	76°	57°	25 th	58°01
	{ Min.	1 st	52°	50°	11 th	57°	40°	11 th	
	{ Mean	—	56°71	54°13	—	67°23	48°80	—	
JULY.	{ Max.	17 th	68°	65°	5 th	97°	61°	6 th	67°61
	{ Min.	1 st	60°	57°	1 st	72°	44°	22 nd	
	{ Mean	—	65°48	62°79	—	81°16	54°06	—	
AUG.	{ Max.	2 nd	66°	63°50	1 st	82°	62°	16 th	63°67
	{ Min.	13 th	59°	58°	12 th	60°	44°	31 st	
	{ Mean	—	62°32	60°56	—	75°32	52°03	—	
SEPT.	{ Max.	5 th	62°	60°	2 nd	77°	59°	9 th	56°21
	{ Min.	22 nd	53°	53°	21 st	57°	34°	21 st	
	{ Mean	—	57°65	56°85	—	66°23	46°20	—	
OCT.	{ Max.	1 st	53°50	53°50	31 st	61°	51°	22 nd	46°22
	{ Min.	30 th	46°	46°	27 th	46°	28°	8 th	
	{ Mean	—	48°55	48°55	—	54°32	38°12	—	
NOV.	{ Max.	9 th	53°	50°50	5 th	63°	57°	1 st	47°38
	{ Min.	30 th	43°	43°50	29 th	39°	25°	30 th	
	{ Mean	—	47°97	47°85	—	53°26	41°50	—	
DEC.	{ Max.	6 th	48°	46°	11 th	57°	52°	4 th	46°56
	{ Min.	1 st	43°	43°50	1 st	48°	26°	28 th	
	{ Mean	—	45°69	45°17	—	52°38	40°74	—	

GENERAL OBSERVATIONS.

January.—It has been ascertained, from an average of twenty-seven years, that the mean depth of rain which falls at Chiswick is at the rate of twenty-four inches per annum or a small fraction more, the exact average being 24·024 inches. In the ten years from 1826 to 1835 inclusive, the average was 24·01 inches; and in the ten years from 1836 to 1845, the average was 24·07 inches. But the amount in the six years from 1846 to the end of 1851 was deficient to the extent of nine inches. One of these years, 1848, was rather a wet season, but three consecutive years, immediately preceding the present, were short of the average about ten inches. The consequence was, that although at this season the surface was moist, yet the lower roots of almost every tree were in compact dry loam. The amount of rain in this month was about an inch above the average. The temperature was also higher than usual, especially during the day; the nights only maintained the average temperature. The wind was chiefly from south-west, and was frequently boisterous, particularly on the nights of the 3rd, 8th, and 21st.

February.—The mean temperature of this month was about a degree below that of the preceding, and a little more than half a degree below the mean of February. This was owing to the nights being generally frosty; for the days were not colder than usual. The first eight days were even mild for the period of the season. The depth of rain was fully half an inch below the average. North-west and south-west winds were most prevalent. There was a little snow on the 10th, but scarcely so much as to whiten the surface of the ground. The 8th, 17th, and 18th were boisterous.

March.—This was a very dry month, with a daily temperature nearly equal to the average, but the nights were cold, the mean minimum being upwards of 5° colder than usual. The nights of February were colder than those of January; and those of the present month were still colder than those of February; so that as the season advanced the cold at night increased. There was a sudden rise of temperature during the day between the 20th and 24th; but the nights continued frosty. The wind was nineteen days from the north-east, and five from east; and always accompanied with frost at night when the sky was clear.

April.—The weather in this month proved highly injurious to

various important productions. The mean maximum temperature of the days was fully equal to the average, and the blossoms of fruit-trees were in consequence brought forward, but in many cases only to be destroyed by unusually severe frosts at night. The wind still continued to blow, cold and dry, from east and north-east. There was not sufficient moisture to form clouds to prevent the escape of heat from the earth by radiation. On the nights of the 19th and 20th the thermometer indicated respectively 12° and 11° below freezing. This was lower than had ever been registered in the Garden so late in the season; eighteen nights in the month were more or less frosty. Apples were killed even in the unexpanded flower-buds. Peach and Nectarine blossoms situated close to the wall, and having a thin screen in front were saved; those more distant from the wall perished.

May.—After two days of south-west wind, accompanied with rain, in the end of last month, the wind veered by west and north, and again from north-east, very dry through the day and frosty at night, up to the 6th of the present month. On this day, the highest temperature was 54° ; next day the wind having changed to west the temperature rose to 70° . After the 17th, north-east winds were prevalent; but the sky was generally overcast till the night of the 29th, and then the radiating thermometer indicated 2° of frost. The mean temperature of the month was $2\frac{1}{2}^{\circ}$ below the average. Nearly the usual quantity of rain fell. The 11th was boisterous, with hail showers in the forenoon and thunder in the afternoon. Thunder was also heard on the 12th and 17th.

June.—This month was cold and exceedingly wet. Want of sun-heat occasioned the mean maximum temperature to be upwards of $4\frac{1}{2}^{\circ}$ below the average; but the temperature at night was not correspondingly low, radiation being greatly prevented by the cloudy state of the atmosphere. There were only four days in which rain did not fall, namely the 22nd and 23rd, and the last two days of the month. The total amount was nearly three inches in excess as compared with the usual quantity for the month. Nearly an inch and a half fell on the ninth alone. In three preceding months the wind was for sixty-two days either from north, north-east, or east; but in the present month it was from none of these points. On the contrary, it was for more than half the day in the month from south-west. The barometer averaged low, yet it was not in any instance particularly so.

July.—This was the hottest month in the present century. The mean maximum was upwards of $6\frac{1}{2}^{\circ}$ above the average maximum of the month. The mean minimum was 2° above the average. On the 5th the thermometer in the shade stood as high as 97° and on the following day at 95° . No rain fell till the 14th. The total quantity was one-tenth of an inch below the average and fell mostly on the 14th, 16th, and 25th; only a very little falling on three other days. Upwards of an inch and a half fell on the 16th alone. Thunder and lightning were of frequent occurrence throughout the month.

August.—This was also a hot month, the mean temperature being nearly two degrees above the average. The quantity of rain was upwards of an inch above the usual quantity for the month; but it fell in large quantities on six days, so that it was but slight on the eight others on which there was rain after dry intervals; seventeen days were dry, and on the whole remarkably fine. There was a very heavy thunderstorm on the 17th; the lightning was chiefly sheet-lightning till 11 P.M.; there was then much forked lightning, with loud thunder, followed by rain in torrents.

September.—The temperature was above the average in the first half of the month; but it afterwards fell considerably, so that the mean was below the average nearly a degree. It was within two degrees of freezing on the night of the 16th, and it was also low on that of the 17th. This sudden fall of temperature was followed by heavy rain on the 18th. The total amount of rain was fully an inch above the average for the month. It fell in large quantities on the 7th, 18th, and 27th. It was heavy on the morning of the 8th, accompanied with thunder and lightning. Fogs were of frequent occurrence throughout the month. The 21st and 30th were boisterous.

October.—This month was wet and cold. The mean temperature was nearly 4° below the average. On eight nights it was below freezing. It was 4° below this point so early in the month as the 8th. The amount of rain was nearly an inch and a quarter above the average. Upwards of an inch fell on the 4th. There was a dry period favourable for many operations between the 9th and 20th. Much rain fell between the 21st and 30th inclusive, more especially on the 24th and 25th. The barometer on those days was not remarkably low, but with less rain and a strong south wind it became much depressed on the 26th. With north and easterly winds it was steadily high during the dry period of the month.

November.—This month was mild for the period of the season, the mean temperature being upwards of 4° above the average. A most unusual quantity of rain fell. On the 11th more than an inch, and again on the 14th about an inch and a quarter depth of rain was measured. The tide in the Thames at Chiswick was four inches higher than it had been known for fifty years. Within this period the highest tide was noted to have occurred on the 28th of December, 1821, but it has been exceeded by that of the 12th of the present month.

December.—The wind was from south-west and south for twenty-eight days, and, owing to this, the temperature was remarkably high for the period of the season. The mean temperature was higher than in any December since 1806; it was higher than that of last October; the nights were fully 10° warmer than those of April of the present year, and within a degree of being as warm as those of May. The minimum was fully $6\frac{1}{2}^{\circ}$ above the average minimum for December. The quantity of rain was about half an inch above the average, and completed the unusual amount of fully thirty-two inches and a half for the year. The 16th was clear and boisterous, with lightning. The 26th and 27th were also very boisterous.

1853.

	THERMOMETER.			RAIN. In. pts.	BAROMETER.			Mean Moisture.
	Max. in Sun.	Min. by Radiator.	Mean of Shaded Therm.		Max.	Min.	Mean.	
January . . .	67	20	40.85	2.14	30.204	28.996	29.663	978
February . . .	48	10	32.53	0.59	30.192	28.978	29.620	974
March . . .	70	12	37.41	1.48	30.191	29.389	29.887	917
April . . .	80	20	45.44	2.58	30.304	29.266	29.825	883
May . . .	100	25	51.27	1.60	30.141	29.407	29.837	792
June . . .	92	32	59.16	2.54	30.127	29.528	29.825	815
July . . .	95	44	61.94	4.17	30.237	29.176	29.835	899
August . . .	95	39	59.69	1.87	30.322	29.116	29.901	902
September . .	90	29	55.45	2.41	30.373	29.083	29.925	938
October . . .	90	24	49.99	3.78	30.080	28.940	29.653	966
November . .	83	14	40.14	0.91	30.517	29.631	30.022	984
December . .	57	5	32.49	0.30	30.336	29.196	29.855	990
Means . . .	80.58	22.83	47.19	24.37	30.252	29.226	29.820	920

GEOTHERMOMETRICAL OBSERVATIONS.

1853.	Day of the Month.	TEMPERATURE OF THE EARTH.		Day of the Month.	TEMPERATURE OF THE AIR.		Day of the Month.	Monthly mean Temperature of the Air.
		1 Foot.	2 Feet.		Day.	Night.		
JAN.	{ Max.	3 rd	46°	45°	20 th	55°	47°	40·85
	{ Min.	27 th	39°	39°	26 th	40°	24°	
	{ Mean	—	42·29	42·16	—	47·35	34·35	
FEB.	{ Max.	1 st	39°	39·50	7 th	45°	34°	32·53
	{ Min.	24 th	34·50	35°	14 th	32°	16°	
	{ Mean	—	36·32	36·73	—	38·32	26·75	
MAR.	{ Max.	14 th	43°	41°	13 th	61°	44°	37·41
	{ Min.	1 st	35°	35°	17 th	33°	17°	
	{ Mean	—	38·14	38·11	—	47·32	27·51	
APRIL.	{ Max.	7 th	48°	46°	30 th	66°	50°	45·44
	{ Min.	1 st	43°	40°	25 th	41°	22°	
	{ Mean	—	45·30	43·90	—	55·36	35·53	
MAY.	{ Max.	28 th	58°	54°	26 th	76°	50°	75·03
	{ Min.	9 th	46°	45°	7 th	42°	27°	
	{ Mean	—	51·53	49·46	—	62·77	39·77	
JUNE.	{ Max.	25 th	61·50	58°	7 th	75°	59°	59·16
	{ Min.	3 rd	54°	52°	1 st	57°	37°	
	{ Mean	—	58·38	55·96	—	69·70	48·63	
JULY.	{ Max.	8 th	65°	60°	7 th	84°	63°	61·94
	{ Min.	3 rd	59·50	57°	14 th	61°	46°	
	{ Mean	—	61·40	58·93	—	71·67	52·22	
AUG.	{ Max.	2 nd	64·50	61·50	19 th	77°	61°	59·69
	{ Min.	31 st	58°	57°	23 rd	63°	41°	
	{ Mean	—	61·11	58·90	—	70·03	49·35	
SEPT.	{ Max.	2 nd	59°	57°	11 th	73°	55°	55·45
	{ Min.	27 th	51°	52·50	26 th	57°	32°	
	{ Mean	—	57·65	56·85	—	65·00	45·90	
OCT.	{ Max.	28 th	54°	55·50	26 th	67°	52°	49·99
	{ Min.	21 st	49°	52°	19 th	53°	27°	
	{ Mean	—	48·55	48·55	—	58·77	41·22	
NOV.	{ Max.	8 th	51°	52·50	1 st	60°	46°	40·14
	{ Min.	24 th	38°	42°	23 rd	33°	18°	
	{ Mean	—	47·97	47·85	—	48·13	32·16	
DEC.	{ Max.	6 th	42°	44·50	9 th	51°	36°	32·49
	{ Min.	31 st	34°	38°	29 th	32°	7°	
	{ Mean	—	45·69	45·17	—	39·03	25·96	

GENERAL OBSERVATIONS.

January.—This was the mildest January since 1834. The nights were warmer on the average than they generally are in March, and this is doubtless attributable to the prevalence of south-west winds, for these blew from that quarter in the course of the month during fourteen days, and sometimes very strongly. The quantity of rain was nearly an inch and a half above the average. The 4th, 6th, 7th, 12th, 19th, and 20th were boisterous, with rain. A hurricane from north on the night of the 22nd was not accompanied with rain. Lightning was seen on the evening of the 11th.

February.—This was a cold month, the mean temperature being upwards of 6° below the average, or 8° colder than in the preceding month. The temperature was not in any instance remarkably low; but on the average it was lower than in any corresponding month for twenty-seven previous years at least. The wind was chiefly from north and north-east. The quantity of rain was nearly an inch below the average; yet it is remarkable that the barometer averaged lower than in the preceding month, when the quantity of rain was much in excess. Snow fell in small quantities on the nights of the 10th, 11th, 12th, and 15th; and some very broad flakes on the forenoon of the 22nd.

March.—This was a cold month, the mean temperature being 4.82° below the average; and it may be remarked that the days were not so much colder than usual as the nights were; for the mean maximum was only 3.42° , whilst the mean minimum was 6.21° below their respective averages. From the 17th to the 26th the weather was very cold night and day, and snow fell occasionally. The 17th was densely overcast, and the temperature at the highest point on that day was only 1° above freezing. The quantity of rain was little more than the average. There was a dense fog on the morning of the 12th.

April.—The mean temperature, though still below, was nearer the average than in the two preceding months. The amount of rain was nearly an inch above the usual quantity; but at intervals there was generally a considerable amount of dryness in the air. North, north-west, west, and south-west winds were almost equally prevalent; but, with a brisk north wind, on the 13th, a frost occurred which greatly injured the crops of Apples, Pears,

and other fruits, the thermometer falling 10° below freezing, and it was also 7° below that point on the night of the 26th. Snow fell on the morning of the 25th. There was a very heavy thunder-storm in London on the 8th between 1 and 2 P.M.; some hail fell in the Garden in the afternoon.

May.—This month was still unfavourable to vegetation; for the winds were generally cold and dry, from north, north-east, and east; and in six nights the thermometer indicated below freezing. On the 10th it was 5° below that point. The mean temperature of the month was upwards of $2\frac{1}{2}^{\circ}$ below the average, and there was scarcely the usual quantity of rain. None fell between the 15th and 27th inclusive. The 9th and 10th were boisterous, with rain. There was lightning on the evening of the 27th, and the 29th was cold and cloudy with thunder-showers.

June.—Dry weather prevailed till the 8th, and between this and the 14th there fell an abundant supply of rain. The weather on the whole was favourable to vegetation. The mean temperature was little more than a degree below the average, whilst the amount of rain was upwards of half an inch above the usual quantity, and nearly one-third of it fell on the 13th alone. South-west winds set in on the 24th, and were strong from the 27th to the end of the month; the 28th and 29th were even boisterous. Heavy thunder-showers occurred on the 14th between 2 and 3 p.m.

July.—The mean temperature was nearly $1\frac{1}{4}^{\circ}$ below the average. The mean minimum was however $\frac{1}{4}^{\circ}$ higher than usual; whilst the mean maximum was 2.69° lower than its average for July. These conditions may be thus respectively accounted for: twenty-three days in this month of warm south and south-west winds maintained a mild temperature at night, but the great amount of vapour which they brought along with them prevented the sun's rays from raising the temperature of the days to its usual height. The quantity of rain was about one and one-third of an inch above the average. On two days, the 13th and 27th, nearly an inch of rain fell on each day, and on the 14th more than half an inch in four hours. There was much lightning, with thunder and rain, on the nights of the 8th and 27th. The 30th was very boisterous.

August.—The mean temperature was upwards of 2° below the average; and, as in the last month, the diminution was owing more to lowness of day temperature than that of the night, the former being 3° below its average, the latter but little more than

$1\frac{1}{2}^{\circ}$. This was against the ripening of crops, which of course depends more in this month on the day temperature than that of the night. The amount of rain was upwards of half an inch below the usual quantity. With the exception of a little on the 1st, none fell till the 16th. The wind was nine days from the south-west, and as many from the north-east, so that as regards time it was equal from these directly opposite quarters; but those from the south-west were the strongest. The 25th was boisterous at night, and the 26th and 27th were very boisterous.

September.—After several days of strong south-west wind in the end of last month, nearly an inch and a quarter of rain fell in the first two days of this, being more than half the quantity which fell throughout the month. The total amount was a little below the average. Four-tenths of an inch fell between 12 and 1 p.m. on the 1st. The mean temperature was $1\frac{1}{2}^{\circ}$ lower than usual. In many parts of the country the weather was generally very fine; but near London there was a want of sunshine, in consequence of which neither the fruit nor the shoots of fruit-trees were perfectly matured. The mornings were often foggy. On the night of the 10th the fog was very dense. The evening of the 24th was clear, with lightning. The 25th was boisterous.

October.—Vegetation was checked by frost on the nights of the 2nd and 3rd, the thermometer on the former indicating 5° below freezing, and the radiating thermometer 8° below that point. The mean temperature of the month was however about the average. The depth of rain was upwards of an inch more than usual for this month. The barometer averaged low. The winds were chiefly from the south and south-west. On the 8th, thunder was heard at 4 p.m., and from that time till nearly 6 p.m., there was much lightning, heavy peals of thunder, and rain in torrents. The drops of rain were very large. Lightning was also seen on the 27th.

November.—The mean temperature was nearly 3° below the average. Very little rain fell till the 26th, and altogether the amount was limited, being nearly one and a half inch below the average. Although there was not much rain, yet the air was almost constantly damp, and fogs were very prevalent; the latter were particularly dense on the 11th, 15th, 22nd, and 23rd. The barometer averaged high.

December.—This was the coldest December since 1846, and with that exception it was colder than any corresponding month for the last 28 years at least. The mean temperature was

upwards of 7° below the average. Snow fell on the 15th, there was bright sunshine on the 16th; the evening of that day continued clear, and before morning the thermometer fell 25° below freezing; on the 25th it fell 18° , and on the 28th 24° below the freezing point. The consequence was that plants which were not quite hardy suffered much; and many were entirely destroyed that had withstood the cold of every winter since 1838. The amount of rain was only one-fifth of the usual quantity, but with two exceptions the air was always found saturated with moisture.

XV.—AN EFFECTUAL AND UNEXPENSIVE MODE OF PROTECTING WALL-TREES FROM SPRING-FROSTS.

THE following method of protecting his wall-fruit from spring frost has been practised for several years, with great success by John Harrison, Esq., F.H.S., of Snelstone Hall, near Ashbourne in Derbyshire.

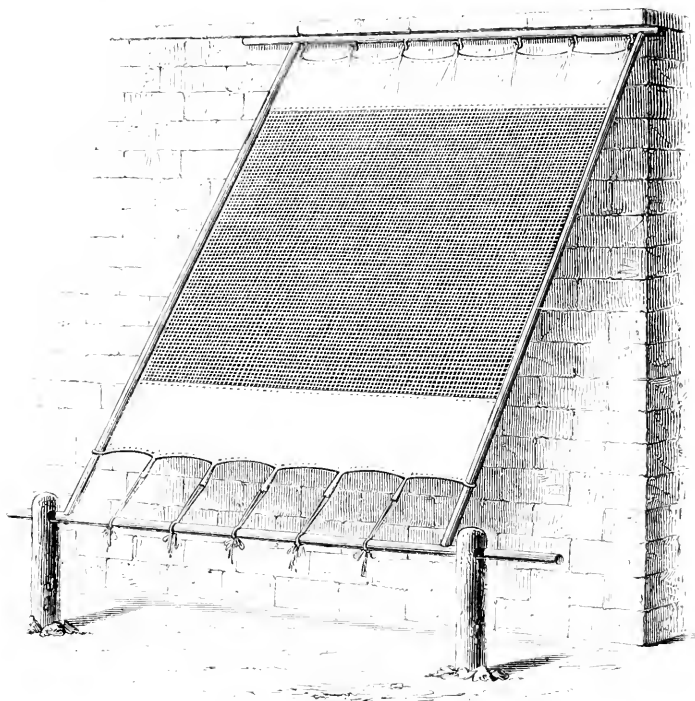
A rod is placed horizontally beneath the coping of the wall. Another horizontal rod is fixed upon posts three feet from the bottom of the wall, and eighteen inches from the ground; the two horizontal rods are connected at intervals by slight braces or rods as is shown in the annexed woodcut.

A covering, prepared by sowing woollen netting, on its upper and lower edges, to coarse calico, is then attached to the upper rod by loops and to the lower by pieces of tape; when the protection is complete.

Mr. Harrison states that the cost of the worsted net (which is two yards wide), is 1s. 8d. per yard running. The calico one yard wide is 2d. or $2\frac{1}{2}$ d. according to quality, and when used is slit down the middle, and one half being sewn to the top, and the other to the bottom of the net, the covering becomes three yards wide. The tape and making up he finds of small cost, while of poles he has abundance of no value. The whole together in London, where every article has to be purchased, ought to be under 2s. a yard running, including making and putting up.

The walls at Snelstone are brick, eleven feet high, with stone coping which projects about two inches on each side. The trees are unnailed before winter, and fastened loosely to the wall to

prevent their being broken by the wind. In this state they are kept until they are ready to burst into flower, the object being to retard vegetation at that season as much as possible. They are



dressed with the following composition, namely:—Take equal quantities of sulphur vivum, scotch snuff and unslaked lime, the lime to be sifted through a fine sieve; then add half quantities of lamp-black, and mix the whole with urine and soft soap-suds to the consistency of thick paint. The old and young wood is dressed with this with a painter's brush, after the trees are pruned, after which they are nailed all from the upper side of the leading branches.

Mr. Harrison's walls are flued, but the fire is used only to ripen the fruit in succession if required, and in a very wet season

to ripen the wood after the fruit is gathered. The flues are never used in the spring.

The advantages of this netting are very great. The walls at Snelstone contain eight peach and eight nectarine trees. The netting is fixed up and taken down in two or three hours, is set up when the blossom cannot longer be kept back, and remains permanently fixed, until taken down about the latter end of May, when all danger from frost is over. The gardener can walk and work under it, to nail or disbud the trees; there are no blistered leaves, and the first shoots always ripen their wood, insuring fruit for the following year. Last year, upon these eight peach and eight nectarine trees, there were ripened upwards of a thousand dozen of fruit (at a small estimate), and there has not been less in any year, since the mode of netting now described was used. In the present year there is quite as good a crop, and the trees are perfectly clean and healthy. The fruit underwent its first thinning in the beginning of June, when of full-sized young fruit, besides many not so large, there were taken off three hundred dozen nectarines, and nine hundred and fifty-four dozen peaches; and a further thinning will be requisite after stoneing.

It may be added that the woollen netting used by Mr. Harrison, is purchased of Messrs. Weatherhead, Irongate, Derby.

XVI.—ASCERTAINED EFFECTS OF THE WINTER OF 1853-4 UPON
EXOTICS CULTIVATED IN THE GARDENS, &c. OF GREAT
BRITAIN. Compiled from various sources.

THE extensive injury sustained by exotic trees and other plants, in consequence of the severity of the frost experienced in the winter of 1853-4, has suggested the importance of collecting what information upon the subject could be entirely relied upon. The succeeding memoranda, partly obtained from direct communication, and partly through the *Gardeners' Chronicle* (marked *G. C.*) will probably be found to include the most material of the facts bearing upon the question. Possibly in some cases the reporters may have their plants under wrong names; or, what is called death from frost may be in truth ascribable to some other cause. It is believed, however, that such sources of error, if they exist, will be sufficiently checked by the number of observations made, and

that, upon the whole, as much certainty has been arrived at as is in the nature of things attainable.*

The following are the places whence returns have been obtained:—

1. Royal Botanic Garden, *Kew*.

The plants that have been more or less injured by the cold of last winter are chiefly such as are considered sufficiently hardy to bear the cold of our ordinary winters: most of them are planted against walls of east, west, and south aspects, and were protected by a covering of mats and fern. In the winter of 1838 the thermometer was observed at 0° : last winter it fell to 13° .—*Jno. Smith*.

2. Garden of the Society, *Chiswick*.

The autumn of 1853 was unfavourable for the maturing of the wood of trees and shrubs, and they were consequently more liable to suffer from the severe frosts in December and January. On the night of the 25th of December, 1853, the common thermometer was as low as 8° , and the radiating thermometer 5° . On the night of the 2nd of January, 1854, the common thermometer indicated 4° , and the radiating thermometer 2° . These were the most destructive winter frosts which have occurred since 1838, but not the most intense, for, on the night of the 7th of February, 1845, the common thermometer was 3° below zero, and the radiating thermometer was 9° below that point. On the 9th of February, 1847, both thermometers were just as low as they were on the 2nd of January, of the present year. These frosts, it may however be observed, occurred later in the season than those of last winter. No frost so intense as that of the 28th of last December, has occurred in any corresponding month for the last twenty-seven years at least.—*Robert Thompson*.

3. Dr. Lindley, *Acton Green*.

A heavy imperfectly drained clay, with the ground raised in places above the surrounding level. Temperature, &c., the same as at Chiswick.

4. Messrs. Standish and Noble, *Bagshot*. (*G. C.* 358.)

The effects of the frost upon plants at Bagshot, up to the

* All these sources of information are referred to in the succeeding pages by the name here printed in *Italics*.

25th of April last, was comparatively trifling. To say, therefore, that any given plant is not hardy because it was materially injured by that very late, and unusually severe frost, would be calculated to mislead, for vegetation then was in a very active state. It is, however, worthy of observation, that well-established plants invariably suffered less than others that were transplanted in the previous autumn. Fitz-Roya patagonica, of two plants, one planted out two seasons ago, the other last autumn, the former is uninjured, and the latter has lost its leader, and the tips of a few of its upper branches.

5. The Lady Grenville, *Dropmore*. (*G. C.* 341.)

The coldest night was on the 3rd of January, when the thermometer fell 28° below the freezing point.—*Philip Frost*.

6. W. R. Baker, Esq., *Bayfordbury*, Herts. (*G. C.* 302.)

7. Robert Hanbury, Esq., Poles, near *Ware*, Herts. (*G. C.* 101.)

8. Joseph Martineau, Esq., Basing Park, *Alton*, Hants.

The effect of the frost upon the plants at this place up to the 25th of April, was comparatively trifling, and a few only of the more doubtful or recently planted sorts, had the advantage of a covering of Fir branches during the intensity of the frosts in winter. All however stood uncovered for many weeks previous to the period which proved so destructive to vegetation generally. The situation of the gardens here is of considerable elevation and exposure. The ground generally is thin and light, on a very stiff clay subsoil intermixed with flint. It may not be out of place to remark, that on a north wall border at this place, there is a nursery for plants of *Pinus* and other kindred genera, where the plants are as green and beautiful, as if they had been wintered in a warm greenhouse, and they present a striking contrast to many of their compeers, in a more open situation.—*James Duncan*.

9. A. R. *Bromley*, Kent. (*G. C.* 342.)

The thermometer on the night of January 2nd, stood at 5° .

10. Mr. William Masters, *Canterbury*. (*G. C.* 357.)

11. H. M. *Worcester*. (*G. C.* 390.)

Soil dry and gravelly.

12. Sir Oswald Mosley, Bart., *Rolleston*, Derbyshire. (*G. C.* 390.)

Fifteen miles to the north of Rolleston, at Osmaston and Snelstone, in the neighbourhood of Ashbourne, the leaves of the Deodar and Araucaria were not injured in the slightest degree. Many of the plants at Rolleston appear to have suffered more from the continued drought of the spring, than from the severity of the frost.

13. Badger Hall, *Shiffnal*, Shropshire. (*G. C.* 373.)

On the nights of the 2nd and 3rd of January, the thermometer was down to 1° above zero, Fahrenheit. The soil here is sandy, and the situation has been found favourable for semi-hardy plants.—*Geo. Cooke*.

14. J. E. Denison, Esq., M.P., *Ossington*, Notts. (*G. C.* 373.)

Ossington is ten miles north of Newark, three miles from the banks of the Trent, on a clay soil, and on an elevation generally at forty feet above water. The thermometer, January 3rd, 1854, was down to zero, perhaps something below it.

15. Highfield House, *Nottingham*. (*G. C.* 253.)

Temperature, January 3rd, 4° below zero—on grass 6° below zero; in the valley in the neighbourhood 8° below zero. Probably no part of England has suffered to the extent that we have near here, especially between this place and the Earl of Harrington's and Newark.—*E. J. Low*.

16. Sir P. de Malpas Grey Egerton, Bart., M.P. *Oulton*, Cheshire. (*G. C.* 373.)

Lat. $53^{\circ} 10'$ N., Long. $2^{\circ} 30'$ W. Soil, sandy loam. Thermometer, December 29th, 1853, at eight A.M. 11° Fahr.; December 30th, at the same hour, 39° Fahr.; January 2nd, 1854, at eight A.M., 27° Fahr.; January 3rd, at the same hour, $7\frac{1}{2}^{\circ}$ Fahr.

17. James Bateman, Esq., Biddulph Grange, *Congleton*. (*G. C.* 340.)

Biddulph Grange is about thirty miles in a direct line from the sea, and about three hundred feet above the sea level; the situation rather exposed, and the climate cold and damp.

18. A Devonian, *South Devon*. (*G. C.* 389.)

19. H., *Windermere*. (*G. C.* 357.)

20. Botanic Garden, *Edinburgh*.

During Monday night the 2nd of January, the thermometer fell to 11° , and during Tuesday night the 3rd of January, the instrument fell to 14° . The next lowest during January was on the night of the 11th, when the thermometer fell to 20° . During February, the lowest was on the night of the 10th, when the thermometer fell to 25° . The effects of the past winter upon vegetation have not been so bad here as in many districts of the country. During the January frost, the plants were all in a fit state to stand it, the wood being well ripened the previous year, and no excitement in the plants by previous mild weather, which proves so injurious with a less degree of frost at a later period of the spring. Of the half-hardy shrubby plants very few indeed have been killed, although many on the south-aspected wall suffered much above their temporary winter coverings of grass mats. In the open ground the greatest havoc committed was amongst the biennial plants; and of the shrubby open-air plants, some small ones planted during the previous summer, and not sufficiently strong to enable them to stand a severe winter, were cut up.—*J. McNab*.

21. Messrs. Veitch and Son, *Exeter*.

22. Botanic Garden, *Liverpool*. (*G. C.* 405.)

23. R. A. Hornby, Esq., *Warrington*. (*G. C.* 405.)

24. Mrs. Wilson, Shirley Common, *Southampton*.

Garden exposed to the south-west, but sheltered slightly on the north and east.

25. The Baroness Rolle, *Bicton*, near Honiton, Devon.

Throughout January the thermometer indicated from 8° to 17° of frost, accompanied by cutting north and north-easterly winds. No very serious injury was then done to the plants. The nights of March and April were frosty, the thermometer showing, on many mornings at sun-rise, from 6° to 10° . The sun rising brightly, and shining fiercely on the thick hoar-frost, began to sear and rust many plants; but it was on the two last weeks in April the most serious injury was done here, after the sap was

pretty well up, and many plants had been excited into free growth. We had then from 6° to 9° , and even 10° of frost one morning at sun-rise. Plants, however, which at the time showed the ill-effects of the hard weather, have now completely recovered, and are making very luxuriant growth.—*James Barnes*.

26. Mr. Samuel Hereman, the Gardens, *Chatsworth*.

In this neighbourhood the thermometer sunk to 6° below zero. The effects on vegetation were most disastrous; hundreds of standard roses perished; in the kitchen garden, where the thermometer only fell to 4° below zero, currants, gooseberries, apples, and nearly all kinds of fruit-trees suffered severely.

27. J. H. Vivian, Esq., M.P., *Singleton*, Swansea. (*G. A.* 469.)

Singleton is 209 miles west of London, and 84 miles west of Bristol; it stands close upon the sea, facing the south, and lies as it were in a curve between two hills projecting into the sea on its eastern and western sides; these hills no doubt afford us great protection, but we are exposed to the S.W. sea breezes, and being within two miles of patent fuel works on the east, we occasionally suffer from the effects of the smoke. This has been the most severe winter we have had for many years; during January we had from 7° to 16° of frost, and in April from 4° to 7° .—*William Barron*.

ABELIA rupestris; untouched, *Bicton*.

ABELIA floribunda; uninjured on a south-east wall, *Southampton*.

ABELIA uniflora; killed, *Acton Green*; not affected during the winter, *Bagshot*.

ABIES Pinsapo; not injured, *Chiswick*; uninjured, on the level ground, *Acton Green*; not affected during the winter, *Bagshot*; perfectly green, *Alton*; slightly hurt, *Rolleston*; not injured, *Nottingham*, and *Southampton*; ten feet in height, appears hardier than P. Cephalonica in resisting spring frosts, *Bicton*,

ABIES nobilis; not injured, *Chiswick*; not affected during the winter, *Bagshot*; very brown, *Ware*; perfectly green, *Alton*; not injured, *Ossington*; foliage browned, but quite recovered, *Exeter*; sixteen feet in height, a fine tree, *Bicton*.

ABIES Webbiana; not injured, *Chiswick*; not affected during

the winter, *Bagshot*; young shoots slightly cut, *Alton*; when young, was injured by late frosts, now that it is twenty-seven feet in height, is uninjured, *Bicton*.

ABIES Jezöensis; not affected during the winter, *Bagshot*; leader slightly injured, *Alton*; quite unscathed, *Congleton*; hardy, *Singleton*.

ABIES cephalonica; young shoots slightly cut, *Alton*; not injured, *Nottingham*.

ABIES Smithiana; many trees browned, *Kew*; not injured, *Chiswick*; plants two feet in height, injured by spring frost, others eighteen to twenty feet, uninjured, *Bicton*.

ABIES Morinda; not injured, *Chiswick*; in every situation much damaged, except where planted on high ground, sheltered from the north and east, *Alton*; not injured, *Nottingham*; suffered, *Singleton*; injured by spring frost, *Bicton*.

ABIES orientalis; not in the least injured, *Chiswick*; not affected during the winter, *Bagshot*; quite unscathed, *Congleton*; not hurt, *Exeter*.

ABIES amabilis; not in the least injured, *Chiswick*; not affected during the winter, *Bagshot*; perfectly green, *Alton*; not hurt, *Exeter*.

ABIES religiosa; killed, *Chiswick*; leader killed two feet down, *Exeter*.

ABIES grandis; not affected during the winter, *Bagshot*; perfectly green, *Alton*; quite unscathed, *Congleton*; not hurt, *Exeter*.

ABIES Pindrow; young shoots slightly cut, *Alton*; not injured, *Nottingham*; young shoots destroyed by spring frosts, *Bicton*.

ABIES khutrow; two feet in height, injured by spring frost, *Bicton*.

ABIES Menziesi, young shoots slightly cut, *Alton*; not injured, *Nottingham*; foliage much browned, *Exeter*; not injured, *Chiswick*; thirty-two feet in height, one of the finest of the species, *Bicton*.

ABIES Douglasi; not injured, *Chiswick*; perfectly green, sheltered from the north and east winds, *Alton*; altogether unscathed, on high ground, *Alton*; much browned in a low situation, *Alton*; not injured, *Ossington*; never thrives, *Singleton*.

ABIES canadensis; perfectly green, *Alton*; not injured, *Nottingham*.

ABIES Brunoniana; nearly dead, *Kew*; lost all its leaves and nearly killed, *Chiswick*; stood the winter unhurt, *Bayfordbury*; points injured and has lost many leaves, *Ware*; much damaged, *Alton*; escaped unhurt, *Shiffnal*; killed down, *Oulton*; killed, *Congleton*; plants two to three feet, tops of shoots destroyed, and plants nearly leafless but breaking again, *Exeter*; uninjured, *Southampton*; stands well, *Singleton*; two feet in height, injured by spring frost, *Bicton*.

ABIES Nordmanniana; not injured, *Chiswick*; not affected during the winter, *Bagshot*; perfectly green, *Alton*; not injured, *Nottingham*; quite unscathed, *Congleton*; not hurt, *Exeter*; quite hardy, *Singleton*.

ABIES obovata; not affected during the winter, *Bagshot*.

ABIES archangelica; not affected during the winter, *Bagshot*.

ABIES elegans; perfectly green, *Alton*.

ABIES Pichta; young shoots slightly cut, *Alton*; young shoots destroyed by spring frosts, *Bicton*.

ABIES Hudsoni; perfectly green, *Alton*.

ABIES (*Cedrus*) Deodara; leaves of many have been browned, and fallen, some trees become very naked, *Kew*; not in the least injured, *Chiswick*; uninjured, on the level ground, *Acton Green*; not affected during the winter, *Bagshot*; stood the winter unhurt, *Bayfordbury*; injured more or less in every position, *Alton*; some killed, others lost their leaves, *Rolleston*; lost all its foliage, in a shrubbery exposed to east winds, and some of the lower branches dead, *Shiffnal*; on a sandy bank, where sheltered, escaped uninjured, *Shiffnal*; lower boughs severely cut, some of the boughs killed, the leaves have quite fallen off, some plants do not appear to have suffered, *Ossington*; every leaf fallen off, and some boughs killed, but recovering rapidly, *Nottingham*; not in the least injured, *Windermere*; not hurt, *Exeter*; suffered much, *Warrington*; will not stand sea breezes, *Singleton*; uninjured, *Bicton*.

ABIES (*Cedrus*) Deodara viridis; not hurt, *Exeter*; brown, and some of the points killed, *Ware*.

ABIES (*Cedrus*) Deodara robusta; not hurt, *Exeter*.

ABIES (*Cedrus*) Atlantica; not injured, *Chiswick*; injured, *Nottingham*; not affected during the winter, *Bagshot*; escaped unhurt, *Shiffnal*; uninjured, *Singleton*.

ABIES (*Cedrus*) Libani; not injured, *Chiswick*; old trees become very naked by their leaves having fallen, *Kew*; not affected during the winter, *Bagshot*; felt the effects of the

winter more than the Deodar, *Bayfordbury*; uninjured, *Rolleston*; slightly injured, *Nottingham*.

ABIES (*Larix*) *Griffithi*; young plants in pots killed, others in the open ground not much injured, *Kew*; killed, *Chiswick*; not affected during the winter, *Bagshot*.

ABIES (*Larix*) sp. n., China; not affected during the winter, *Bagshot*.

ABIES (*Larix*) *pendula*; not injured, *Nottingham*.

ADENOCARPUS *intermedius*; a fine bush, untouched, *Bicton*.

ACACIA *Browni*; untouched, *Bicton*.

ACACIA *dealbata*; slightly sheltered. much injured, *Southampton*.

ACACIA *mollis*; killed, *Kew*.

ACACIA *affinis*; dead to the ground, *Kew*; plant twenty feet high, much cut, but breaking again from the old wood, *Exeter*.

ACACIA *Julibrissin*; killed down to the ground in 1838, injured but slightly by last winter's cold, *Kew*.

ACACIA *melanoxylon*; killed down to the ground, south wall, *Chiswick*.

ACACIA *prostrata*; killed, it had grown and flowered luxuriantly on a south-east wall for several years, *Ware*.

ACACIAS; on a south wall suffered much, above their temporary winter coverings of grass mats, *Edinburgh*.

ACER *caudatum*; not injured, *Chiswick*.

ACER *palmatum*; a large, old plant, has all its last year's shoots killed, and also some of the older branches, *Chiswick*.

ACER *villosum*; killed, *Chiswick*.

AKEBIA *quinata*; not injured, *Chiswick*.

ALATERNUS; partially affected, *Rolleston*; injured, though sheltered by a wall on the west; north, by buildings and trees; east, by shrubs, *Shiffnal*; killed to the main stem on a wall facing the east, *Liverpool*.

ALATERNUS, variegated; injured, though sheltered by a wall on the west; north, by buildings and trees; east, by shrubs, *Shiffnal*.

ALSTREMERIA *aurea*; *Van Houtte's varieties*, not injured, *Chiswick*.

ALOYSIA *citriodora*; killed, though it had stood five years, *Bromley*; twenty feet high, against the house, uninjured, *Singleton*.

AMPELOPSIS *Royleana*; killed down to the ground, but growing strong again, *Chiswick*.

AMYGDALUS angustifolia ; not injured, south wall, *Chiswick*.

AMYGDALUS incana ; not injured, south wall, *Chiswick*.

ANDROMEDA floribunda ; not injured, *Chiswick*.

ANDROMEDA formosa ; not hurt, *Exeter*.

ANEMONES ; in the height of perfection, *Windermere*.

ARAUCARIA imbricata ; some young plants injured, *Kew* ; not injured, *Chiswick* ; unhurt, *Bayfordbury* ; uninjured in every position, *Alton* ; much injured and many of the leaves dead, *Rolleston* ; a fine plant ten feet high, on the east side of the house, escaped with very little damage, *Shiffnal* ; much injured, and several young plants dead, on the west side of the house, *Shiffnal* ; lower boughs turned brown, some quite killed, *Ossington* ; many killed, *Nottingham* ; uninjured, *Congleton* ; not hurt, *Exeter*, and *Southampton* ; all more or less injured, some killed, *Chatsworth* ; uninjured, *Bicton* ; stands sea breezes well, *Singleton*.

ARAUCARIA Braziliensis ; killed, *Bicton* ; a fine plant thirteen feet high, protected, is slightly cut, but recovered, *Singleton*.

ARAUCARIA Ridolfi, killed, *Chiswick*.

ARAUCARIA Cunninghami ; dead, *South Devon*.

ARALIA spinosa ; dead, *Alton*.

ARALIA japonica ; killed to the ground, on the east side of the house, *Shiffnal* ; only the points of the shoots killed on the west side of the house, *Shiffnal*.

ARALIAS ; suffered much, above their temporary winter coverings of grass mats, on a south wall, *Edinburgh*.

ARBUTUS procera ; edges of leaves browned and destroyed but otherwise uninjured and flowering, *Chiswick* ; is alive in an exposed situation, growing freely until nipped by the frost in April, *Shiffnal* ; uninjured, *Singleton*.

ARBUTUS Andrachne ; killed to the ground, *Shiffnal* ; killed, *Oulton* ; not hurt, *Exeter* ; uninjured, *Singleton*.

ARBUTUS Unedo ; killed down to the ground in 1838, injured but slightly by last winter's cold, *Kew* ; not injured, *Chiswick* ; leaves very much blotched and injured, *Ware* ; dead, *Rolleston* ; killed to the ground, *Shiffnal* ; all killed, some specimens were thirty years old, the bark forced off the trees by the frost, *Nottingham* ; killed down, *Oulton* ; very much cut in the open ground, *Liverpool* ; tops cut, and foliage browned, *Exeter* ; much damaged, and of young plants five feet high, some have been killed, while others are not injured, *Dropmore* ; much cut, old plants forty or fifty years old, never been hurt before, *Ossington* ; slightly pinched, *Southampton*.

ARBUTUS *Milleri*; dead, *Shiffnal*.

ARBUTUS *hybrida*; dead, *Shiffnal*.

ARBUTUS *Unedo coccinea*; killed to the ground, *Shiffnal*.

ARBUTUS *Unedo salicifolia*; dead, *Shiffnal*.

ARBUTUS *photinifolia*; not hurt, *Exeter*.

ARCTOSTAPHYLOS *pungens*; killed, *Kew*.

ARCTOSTAPHYLOS *tomentosa*; killed, *Chiswick*.

ARISTOTELIA *Maqui*; a large plant nearly killed down to the ground, but breaking again strong, *Chiswick*; a plant covering a space of eight yards, with four or five stems, 4 inches in diameter, in a very sheltered situation in the open air, killed to the ground, *Liverpool*.

AURICULAS; in the height of perfection, *Windermere*.

ARMERIA *formosa*; killed, *Bromley*.

ASPARAGUS *acutifolius*; not injured, south wall, *Chiswick*.

AUCUBA *japonica*; not injured, *Chiswick*; partially injured, *Rolleston*; much injured, some plants killed to the ground, *Nottingham*.

AZALEA *ovata*; uninjured by winter, *Chiswick*.

AZALEA *californica*; not injured, *Chiswick*.

AZALEA *indica alba*; stood in the shrubbery for the last six years, almost killed, *Warrington*; unhurt, *Southampton*.

AZARA *dentata*; cut back to old wood, but starting freely again, *Chiswick*.

BAMBOO, hardy; from the Himalayas, killed down to the ground, but starting freely again, *Chiswick*.

BAMBOO; killed, *Oulton*.

BAMBUSA *falcata*; cut to the ground in the open air, *Liverpool*; pinched, but not killed, *Southampton*.

BEDFORDIA *salicina*; killed, *Kew*.

BENTHAMIA *fragifera*; injured on the wall, killed away from the wall unprotected, *Kew*; very much injured in a north aspect, but breaking again, *Chiswick*; killed, *Ware*; injured, *Bromley*; uninjured, *Singleton*.

BERBERIS *Fortuni*; away from wall not injured, *Kew*; killed, *Chiswick*; not injured, south wall, *Chiswick*; uninjured, *Alton*; killed down, *Oulton*.

BERBERIS *glumacea*; not injured at the bottom of the wall, *Chiswick*; uninjured, growing near a wall and protected by laurels, *Shiffnal*; slightly sheltered, uninjured, *Southampton*.

BERBERIS *trifoliata*; killed in open border, *Chiswick*; not injured, south wall, *Chiswick*; killed to the ground, *Shiffnal*;

uninjured, *Bicton*; sheltered by south-east wall, slightly cut, *Southampton*.

BERBERIS nepalensis; nearly killed, away from wall, *Kew*; not injured in a dry sheltered situation on rockwork, *Chiswick*; under glass, behind a north wall, uninjured, *Acton Green*; sheltered by a south-east wall, slightly cut, *Southampton*.

BERBERIS fascicularis; not injured, *Chiswick*; cut down, *Shiffnal*; sheltered by a south-east wall, unhurt, *Southampton*.

BERBERIS fascicularis hybrida; not injured, *Chiswick*.

BERBERIS intermedia; not affected during the winter, *Bagshot*.

BERBERIS Beali; not affected during the winter, *Bagshot*.

BERBERIS japonica; not affected during the winter, *Bagshot*.

BERBERIS repens; uninjured, *Alton*.

BERBERIS Aquifolium; not in the least injured, *Windermere*.

BERBERIS dulcis; slightly injured in the open border, *Chiswick*; not injured, south wall, *Chiswick*; quite hardy, *Alton*; sheltered by south-east wall, uninjured, *Southampton*.

BERBERIS dulcis rotundifolia; not injured, south wall, *Chiswick*.

BERBERIS asiatica, *aristata*, &c.; all uninjured, *Acton Green*; killed everywhere, *Shiffnal*.

BERBERIS Knighti; killed to the ground on the west side of the house, *Shiffnal*; escaped unhurt on the east side of the house, *Shiffnal*.

BERBERIS tinctoria; killed, *Kew*; killed to the ground, but starting again, *Chiswick*.

BERBERIS Darwini; not injured, *Chiswick*; not affected during the winter, *Bagshot*; injured, *Shiffnal*; perfectly hardy, *Congleton*; unhurt, *Exeter*; uninjured, *Southampton*.

BERBERIS glauca; killed, *Kew*.

BERBERIS empetrifolia; not injured, *Chiswick*.

BERBERIS Wallichiana; killed down to the ground, but starting again, *Chiswick*; killed to the ground, *Shiffnal*; slightly sheltered, uninjured, *Southampton*.

BERBERIS cuneata; lost its leaves, otherwise unhurt, *Chiswick*; not at all injured, *Warrington*.

BERBERIS parviflora; not injured, south wall, *Chiswick*.

BERBERIS hypoleuca; part of the young shoots killed back, and foliage injured, south wall, *Chiswick*.

BERBERIS dealbata; not injured, south wall, *Chiswick*.

BERBERIS coriaria; quite hardy, *Alton*.

BERBERIS flexuosa; a new species from Peru, unhurt, *Exeter*.

BERBERIS Lycium; uninjured, growing near a wall and protected by laurels, *Shiffnal*.

BIOTA orientalis; slightly injured, *Oulton*.

BIOTA aurea; not hurt, *Exeter*.

BIGNONIA capreolata; partially injured, south wall, *Chiswick*.

BIGNONIA grandiflora; not injured, south wall, *Chiswick*.

BLETIA sp., China; not affected during the winter, *Bayshot*.

BRIDGESIA spicata; not injured, south wall, *Chiswick*.

BROUSSONETIA Kämpferi; not injured, *Chiswick*.

BROUSSONETIA papyrifera; injured, though sheltered by a wall on the west, north by buildings and trees, east by shrubs, *Shiffnal*.

BUPLEURUM fruticosum; not injured, *Chiswick*.

BRACHYGLOTTIS repanda; killed, *Kew*.

BUDDLEA Lindleyana; injured, *Kew*; not injured, north wall, *Chiswick*; killed, *Windermere*; killed, *Warrington*; cut to the ground, *Bicton*.

BUDDLEA globosa; not injured (killed in 1838), *Kew*; killed, *Rolleston*; small branches killed on a wall facing the west, *Liverpool*.

BUXUS balearica; very much injured, *Rolleston*; killed down, *Oulton*.

BUXUS argentea; injured, *Nottingham*.

BUXUS chinensis; killed, *Nottingham*; uninjured, *Acton Green*.

CALYCANTHUS occidentalis; not injured, *Chiswick*.

CALYCOTOME spinosa; killed, south wall, *Chiswick*.

CALLITRIS quadrivalvis; dead, *Kew*.

CALLITRIS cupressiformis; unhurt, *Bicton*.

CALLITRIS macrostachya; unhurt, *Bicton*.

CALLITRIS australis; killed, *Bicton*.

CALLITRIS pyramidalis; not hurt, *Exeter*.

CALYSTEGIA pubescens; is coming up strongly in a border against a south wall, *Warrington*.

CALLISTEMON salignum; slightly injured (killed in 1838), *Kew*.

CAMELLIA sasanqua; killed on east wall, *Kew*.

CAMELLIAS; not injured in any situation, north wall, *Chiswick*.

CAMELLIA, double white; planted against a south wall, is now in full flower, April 7, *Windermere*.

CAMELLIA, double red; planted in a shrubbery in the autumn of 1853, without protection, now covered with flowers, April 7,

Windermere ; on a north-west wall and border, much cut, *Southampton* ; suffered considerably, *Singleton*.

CAMELLIA Warratah ; planted in a shrubbery in the autumn of 1853, without protection, is looking a little yellow from cold, *Windermere*.

CATALPA Bungeana ; uninjured, except the points of the unripe shoots, which are killed, *Chiswick*.

CANTUA dependens ; though in a warm nook and doubly covered, is quite killed, *Worcester* ; in flower now (May 23) against an east wall, unprotected, *South Deron* ; killed on a south-east wall, *Southampton*.

CANTUA bicolor ; in flower now (May 23), against an east wall, unprotected, *South Deron*.

CANTUA pyrifolia ; killed to the ground, *South Deron*.

CAPRIFOLIUM japonicum ; killed down to the ground, south wall, *Chiswick*.

CAPRIFOLIUM flexuosum ; not injured, south wall, *Chiswick* ; killed on east aspect, but slightly injured on south and west, *Kew*.

CESTRUM Parqui ; killed to the ground, *Kew*.

CERCIS sp. north of India ; young shoots killed, but starting strong again, south wall, *Chiswick*.

CERCOCARPUS sp. from California ; very much injured, but starting again, *Chiswick*.

CERCIS japonica ; killed, *Chiswick*.

CERASUS lusitanica ; some not the least injured, others but slightly, much injured in 1838, *Kew* ; many have been cut off to the ground, *Shiffnal* ; old plants in many places cut and injured, *Ossington* ; many killed, *Nottingham* ; leaves very much blotched and injured, *Ware* ; partially injured, *Rolleston* ; old plants in many places cut and injured, *Ossington* ; suffered considerably, *Warrington*.

CERASUS Laurocerasus ; much injured, *Rolleston* ; suffered considerably, *Warrington* ; are looking as if there had been no winter on them, *Windermere*.

CERASUS ilicifolia ; very much injured, particularly in young shoots, *Chiswick* ; killed, on the level (this had been much injured by the wet of 1852-3), *Acton Green* ; nearly killed, *Bagshot* ; much damaged, *Alton* ; injured, though sheltered by a wall on the west, north by buildings and trees, east by shrubs, *Shiffnal* ; the tops cut, but breaking well again, *Exeter* ; slightly cut, *Southampton*.

CERASUS Capollim ; slightly injured above the wall, *Chiswick*.

CERASUS Caroliniana; injured, though sheltered by a wall on the west, and on the north by buildings and trees, and on the east by shrubs, *Shiffnal*.

CEANOTHUS pallidus; not injured, south wall, *Chiswick*; killed to the main stem on a wall facing the south, *Liverpool*.

CEANOTHUS cuneatus; dead, *Kew*; killed in open border, but uninjured against end of greenhouse, *Chiswick*.

CEANOTHUS dentatus; dead to the ground, *Kew*; killed in open border, *Chiswick*; some of the foliage browned, south wall, *Chiswick*; killed to the ground on a wall with an eastern aspect, *Shiffnal*; not hurt against a wall, *Exeter*; uninjured on a south-east wall, *Southampton*.

CEANOTHUS rigidus; dead, *Kew*; very slightly injured, even in very exposed situations, *Chiswick*; flowered beautifully on the lawn, *Alton*; not hurt, against a wall, *Exeter*; not injured, as open standards, *Exeter*; killed to the ground, on a wall with an eastern aspect, *Shiffnal*; uninjured, *Bicton*; on a south-east wall, untouched, *Southampton*.

CEANOTHUS integerrimus; not injured, *Chiswick*; killed to the ground, on a wall with an eastern aspect, *Shiffnal*. (The last is probably a different species.)

CEANOTHUS azureus; very much injured, and in one instance killed, south wall, *Chiswick*; suffered no damage, trained on a southern aspect, *Alton*; killed to the ground, on a wall with an eastern aspect, *Shiffnal*; killed to the ground, on a wall facing the south, *Liverpool*; on a south-east wall, untouched, *Southampton*.

CEANOTHUS azureus pallidus; not injured, south wall, *Chiswick*.

CEANOTHUS americanus; killed back a good deal, *Chiswick*.

CEANOTHUS thyrsiflorus; small shoots a little touched, *Kew*; young shoots killed, but again starting vigorously, south wall, *Chiswick*; a very large standard plant, very much injured, all the small branches killed, and some of the large ones, *Chiswick*; killed to the ground, on a wall with an eastern aspect, *Shiffnal*; not hurt, against a wall, *Exeter*; uninjured, *Bicton*; on a south-east wall, untouched, *Southampton*.

CEANOTHUS papillosus; dead to the ground, *Kew*; not injured, as open standards, *Exeter*; not hurt, against a wall, *Exeter*; small plants much cut, *Exeter*; not injured, south wall, *Chiswick*; killed, in open borders, *Chiswick*; killed to the ground, on a wall with an eastern aspect, *Shiffnal*; uninjured, *Bicton*; on a south-east wall, untouched, *Southampton*.

CEANOTHUS verrucosus; small shoots a little touched, *Kew*; not injured, *Chiswick*.

CEPHALOTAXUS Fortuni; on the ground level, at foot of an east wall, uninjured, *Acton Green*; not affected during the winter, *Bagshot*; perfectly safe, *Alton*; perfectly hardy, *Congleton*; perfectly hardy, *South Devon*; not hurt, *Exeter*; uninjured, *Bicton*.

CEPHALOTAXUS adpressa; not injured, *Chiswick*; on the ground level, at foot of an east wall, uninjured, *Acton Green*; beautifully green whether on standards or its own roots, *Alton*.

CEPHALOTAXUS Harringtoni; perfectly safe, *Alton*; unharmed, *Congleton*.

CEPHALOTAXUS pedunculata; not affected during the winter, *Bagshot*.

CEPHALOTAXUS drupacea; unharmed, *Congleton*; not hurt, *Exeter*.

CHAMEROPS humilis; very much cut, but starting again, (planted close to the bottom of the wall), *Chiswick*.

CHAMEROPS excelsa?; (the Chusan Palm), uninjured, in a northern aspect, *Chiswick*; not affected during the winter, *Bagshot*; quite hardy, *South Devon*.

CHIMONANTHUS fragrans, and varieties; not injured, south wall, *Chiswick*.

CINERARIAS, Seedling; covered with tan, alive and shooting nicely, *Worcester*.

CISTUS formosus; uninjured, *Southampton*.

CISTUS ladaniferus; uninjured, *Bicton*, and *Southampton*.

CISTUS cymosus; dead, *Kew*.

CISTUS Clusii; dead, *Kew*.

CISTUS latifolius; dead, *Kew*.

CISTUS incanus; dead, *Kew*.

CISTUS populifolius; dead, *Kew*.

CISTUS oblongifolius; dead, *Kew*.

CISTUS creticus; a little raised above the level, uninjured (?), *Acton Green*.

CISTUS cyprius; quite killed, *Warrington*; killed everywhere, *Shiffnal*.

CISTUSES; nearly all killed where fully exposed, *Chiswick*; one or two tender kinds killed, but not many, *Southampton*.

CITHAREXYLUM ilicifolium; injured, *Kew*.

CLEMATIS Gebleri; killed, *Bicton*.

CLEMATIS Grahami; not injured, south wall, *Chiswick*.

CLEMATIS grata ; not injured, south wall, *Chiswick*.

CLEMATIS polymorpha ; not injured, south wall, *Chiswick*.

CLEMATIS montana ; not injured, south wall, *Chiswick*.

CLEMATIS calycina ; not injured, south wall, *Chiswick*.

CLEMATIS Nipalensis ; killed down to the ground, south wall, *Chiswick*.

CLETHRAS ; all very much cut up, in the open ground, *Liverpool*.

CLEYERA japonica ; killed, *Kew* ; injured, though sheltered by a wall on the west, and north by buildings and trees, on the east by shrubs, *Shiffnal*.

COLLETIA horrida ; killed, south wall, *Chiswick* ; killed to the sawdust that was put round it to protect it, is now putting forth shoots, *Shiffnal* ; killed down, *Oulton*.

COLLETIA Ephedra ; very slightly injured, growing strong, south wall, *Chiswick*.

COLLETIA serrata ; not injured, south wall, *Chiswick*.

COLLETIA spinosa ; injured, *Bromley*.

COLQUHOUNIA coccinea ; killed to the ground, *Kew*.

CORIARIA Nipalensis ; cut back to near the ground, but starting strong again, south wall, *Chiswick*.

CORNUS sp. Mexico ; cut back slightly, but growing freely again, south wall, *Chiswick*.

CORNUS macrophylla ; part of the young shoots killed back, south wall, *Chiswick*.

COTONEASTER denticulata ; killed to the ground, *Kew* ; injured in the foliage only, south wall, *Chiswick* ; killed in open border, *Chiswick*.

COTONEASTER Roylei ; not injured, south wall, *Chiswick*.

COTONEASTER microphylla ; injured, *Shiffnal*.

CRATEGUS Layii ; not injured, *Chiswick*.

CRATEGUS crenulata ; not injured, south wall, *Chiswick*.

CRATEGUS mexicana ; a very large plant, much injured, south wall, *Chiswick*.

CRYPTOMERIA japonica ; not injured, *Chiswick* ; some with branches and leaders killed, and others wholly uninjured, *Bagshot* ; leader killed in an exposed situation, but in sheltered places it is not even browned, *Dropmore* ; stood the winter unhurt, *Bayfordbury* ; in a low situation, very much injured, the leading shoots being entirely destroyed, *Alton* ; unhurt, *Rolleston* ; eighteen feet high, escaped unhurt, *Shiffnal* ; not injured, *Ossington* ; not injured, *Nottingham* ; slightly injured, *Oulton* ; stood

well, especially such as face the north (those to the south are browned), *Congleton*; suffered slightly, *Windermere*; young plants three to four feet, much injured; plants ten to twelve feet, in one situation, leader destroyed three or four feet; plants ten to twelve feet, in another situation, not injured, *Exeter*; uninjured, *Southampton*, and *Singleton*; twenty feet in height, and full of cones, uninjured, *Bicton*.

CRYPTOMERIA japonica Lobbi; not injured, *Chiswick*; retained its green unimpaired through the winter, and this, too, by the side of plants of *C. japonica*, which have turned perfectly brown, *Congleton*; smaller plants not injured, *Exeter*; several large plants ten to fifteen feet high, not in the least injured, *Exeter*.

CUNNINGHAMIA sinensis; not injured, *Chiswick*; near a pond, has had its leader killed, but others are not damaged, except by snow, *Dropmore*; brown as usual after the frosts, *Alton*; cut, and leaves much browned, but recovering, *Exeter*; thirty-two and eighteen feet high, fine plants, sheltered by plantations, had the tips slightly cut, *Singleton*; all the lower part of the tree had a brown appearance, but now making young wood, *Bicton*.

CUPRESSUS elegans; some with branches and leaders killed, and others wholly uninjured, *Bagshot*; killed, *Congleton*.

CUPRESSUS expansa; not injured, *Chiswick*; dead, *Alton*.

CUPRESSUS funebris; not injured, *Chiswick*; uninjured, a little raised, *Acton Green*; some with branches and leaders killed, and others wholly uninjured, *Bagshot*; very much damaged in several positions, *Alton*; much injured, *Nottingham*; killed, *Oulton*; killed, *Congleton*; perfectly hardy, *South Devon*; leading shoots injured, *Windermere*; not hurt, *Exeter*; uninjured, *Southampton*; safe from frost, *Singleton*.

CUPRESSUS Uxheana; some killed, others not much hurt, *Kew*; not injured, *Chiswick*; damaged, *Bayfordbury*; very much browned on the south side, and many of its points killed, *Ware*; killed, *Rolleston*; severely hurt, *Ossington*; killed, *Oulton*; killed, *Congleton*; large plant, leader killed; other situations, smaller plants not hurt, *Exeter*; twenty feet high, uninjured, *Bicton*.

CUPRESSUS sempervirens; not injured, *Chiswick*; top killed, *Alton*; young plants much cut; large plants fifteen feet high, uninjured, *Exeter*; slightly injured, *Oulton*.

CUPRESSUS Goveniana; but slightly injured. *Kew*; not injured, *Chiswick*; uninjured on level ground, *Acton Green*; some with branches and leaders killed, and others wholly uninjured, *Bag-*

shot; killed, *Ossington*; much injured, *Nottingham*; not hurt, *Exeter*; killed, *Oulton*; killed, *Warrington*; safe, *Singleton*; slightly sheltered on the north side, uninjured, *Southampton*.

CUPRESSUS macrocarpa; not injured, *Chiswick*; uninjured, on level ground, *Acton Green*; killed, *Rolleston*; sixteen feet high, dead, *Shiffnal*; in the case of six fine plants, the leading shoots killed in every one, perhaps a foot or eighteen inches down; some injured, having parts struck and killed; no plant wholly killed, *Ossington*; slightly injured, *Oulton*; not hurt, *Exeter*; twelve feet high, uninjured, *Bicton*: safe, *Singleton*; slightly sheltered on north side, uninjured, *Southampton*.

CUPRESSUS torulosa; many much injured, *Kew*; a large plant on an elevated situation fully exposed, not injured; all smaller plants more or less injured, *Chiswick*; slightly browned, *Alton*; some partially injured, others dead, *Rolleston*; of various sizes, dead, *Shiffnal*; killed, *Nottingham*; five plants killed, three injured, three untouched, *Oulton*; killed, *Congleton*; much cut, *Exeter*; uninjured, *Singleton*; twenty-four feet high, uninjured, *Bicton*.

CUPRESSUS thurifera; only very slightly injured in a few of the smaller twigs, *Chiswick*; much injured, a little raised, *Acton Green*; some with branches and leaders killed, and others wholly uninjured, *Bagshot*; damaged, *Bayfordbury*; very brown on the south side, *Ware*; slightly browned, *Alton*; killed, *Rolleston*; twenty-three feet six inches high, dead, *Shiffnal*; killed, *Nottingham*; killed, *Congleton*.

CUPRESSUS religiosa; dead, *Kew*; nearly killed, *Exeter*.

CUPRESSUS lusitanica; killed, *Kew*; not hurt, *Exeter*; twenty feet high, uninjured, *Bicton*.

CUPRESSUS Tourneforti; not injured, *Chiswick*.

CUPRESSUS Corneyanus; not affected during the winter, *Bagshot*.

CUPRESSUS majestica; very slightly injured, *Bayfordbury*.

CUPRESSUS mexicana; damaged, *Bayfordbury*.

CUPRESSUS Knighti; very slightly injured, *Bayfordbury*.

CUPRESSUS sinensis; not injured, *Ossington*.

CUPRESSUS variegata; nearly killed, *Exeter*.

CUPRESSUS horizontalis; much injured, *Nottingham*; killed, *Warrington*; not injured, *Chiswick*.

CYTISUS nubigenus; perfectly hardy, *South Devon*.

DACRYDIUM Franklini; dead, *Kew*; killed, *Chiswick*; stood the winter comparatively uninjured, a few of the extreme tips of the branches only being destroyed—only had the advantage of a

slight protection of spruce fir branches during the intensity of the frost, *Alton*.

DACRYDIUM Mayi ; protected, uninjured, *Bicton*.

DAPHNE Aucklandi ; killed, *Chiswick*.

DAPHNE Fortuni ; killed, *Chiswick*.

DAPHNE japonica rubra ; injured, *Shiffnal*.

DAPHNE pontica ; injured, *Shiffnal*.

DAPHNE variegata ; killed, *Shiffnal*.

DEERINGIA Amherstæ ; killed down to the ground, a very large plant, but starting very weakly, south wall, *Chiswick*.

DESFONTAINIA spinosa ; not in the least injured, until the frost of April, *Exeter*.

DEUTZIA gracilis ; not injured, *Chiswick* ; not hurt, on a wall with an eastern aspect, *Shiffnal* ; uninjured, *Southampton*.

DEUTZIA scabra ; not injured, *Chiswick* ; damaged slightly, *Alton* ; uninjured, *Bicton* ; uninjured, *Southampton*.

DEUTZIA crenata ; killed back a good deal in the wood, *Chiswick*.

DEUTZIA staminea ; not injured, south wall, *Chiswick*.

DAMMARA australis ; nearly killed, *Bicton*.

DICKSONIA antarctica ; dead, *South Devon*.

DIELYTRA spectabilis ; lived out three winters, flowers browned by the late frosts, *Shiffnal* ; stood the winter without any protection, *Warrington* ; uninjured, *Chiswick* ; uninjured, *Southampton*.

DIOTIS ceratoides ; not injured, south wall, *Chiswick*.

DISCARIA Tournatou ; injured, *Kew*.

DRACÆNA indivisa ; two large plants cut to the ground, although in a dry situation, where they had stood the previous winter, but breaking again at the root, *Chiswick* ; cut down to the ground, *Shiffnal*, and *Congleton* ; not in the least injured, *Exeter*. (Two large plants which had stood out of doors several winters were killed to the ground in Mr. Harrison's garden, at Snelstone Hall, near *Ashbourne* in *Derbyshire*, but one seems likely to push from the root.)

DUVAUA dependens ; slightly injured, away from the wall, *Kew* ; not injured, south wall, *Chiswick* ; uninjured, *Bicton*.

DUVAUA dentata ; killed to the ground, on wall, *Kew*.

DUVAUA longifolia ; cut back in the shoots very much, but growing again vigorous, south wall, *Chiswick* ; uninjured, *Bicton*.

DUVAUA ovata : not injured, south wall, *Chiswick* ; uninjured, *Bicton*.

ECHEVERIA retusa ; raised above the level, and screened by stones, safe until the thermometer fell to 4° , when it died, *Acton Green*.

EDWARDSIA chrysophylla ; killed, on a wall facing the south, *Liverpool*.

EDWARDSIA grandiflora ; very slightly hurt, on a wall facing the south, *Liverpool* ; uninjured, *Singleton*.

EDWARDSIA microphylla ; slightly injured (killed in 1838), *Kew* ; the small branches killed, on a wall facing the south, *Liverpool* ; not injured, south wall, *Chiswick*.

EDWARDSIA chilensis ; slightly injured, south wall, *Chiswick*.

EHRETIA serrata ; cut back to old wood, south wall, *Chiswick*.

ELEAGNUS reflexus ; not injured, *Chiswick*.

ELEAGNUS parvifolius ; not injured, *Chiswick* ; uninjured, *Acton Green*.

ELSHOLTZIA polystachya ; not injured, south wall, *Chiswick*.

EMPETRUM rubrum ; not injured, *Chiswick*.

ERICA arborea ; quite killed, *Warrington*.

ERICA mediterranea ; killed in 1838, injured but slightly by last winter's cold, *Kew* ; away from the wall, much hurt, *Kew* ; much injured, *Nottingham* ; killed, *Oulton*.

ERICA multiflora ; killed in 1838, injured but slightly by last winter's cold, *Kew* ; not injured, *Chiswick*.

ERIOBOTRYA japonica ; not injured, south wall, *Chiswick*.

ESCALLONIA rubra ; killed to the ground, away from the wall, *Kew* ; small branches killed, on a wall facing the east, *Liverpool* ; not injured, south wall, *Chiswick* ; killed to the ground, *Shiffnal* ; much cut, *Southampton*.

ESCALLONIA rubra var. *viscosa* ; killed to the strong branches, on a wall facing the east, *Liverpool*.

ESCALLONIA montevidensis ; injured, *Kew* ; cut back to old wood, but starting strong again, *Chiswick*.

ESCALLONIA macrantha ; lost all its leaves, and had its branches cut back a considerable way, but starting again vigorously, *Chiswick* ; slightly injured, *Kew* ; much injured, *Bagshot* ; safe as a Grass plant, *Alton* ; killed to within an inch of the ground, *Worcester* ; killed to the ground, *Shiffnal* ; not hurt, against a wall, but in the open ground as a shrub, the top and shoots cut, but breaking out well, *Exeter* ; did not suffer in the least, *Singleton* ; killed about half way down, *Southampton*.

ESCALLONIA pulverulenta ; killed to the ground, *Kew*.

ESCALLONIA Poeppigiana : not in the least injured, *Exeter*.

ESCALLONIA pubescens ; killed to the ground, on a wall facing the east, *Liverpool*.

ESCALLONIAS ; all dead to the ground, *Kew*.

EUCALYPTUS sp. ; two plants twenty feet high—one killed, the other slightly injured, *Kew*.

EUCALYPTUS montana ; untouched, *Bicton*. (Is this *E. coccifera* ?)

EUCALYPTUS robusta ; on the wall, killed back to the main stem, *Kew*.

EUCALYPTUS coccifera ; a fine plant, in the open ground, killed ; against a south wall, little injured, *Chiswick* ; plant twenty feet high, in an open situation, not in the least injured, *Exeter*.

EUCALYPTUS amygdalina ; killed to the ground, *Kew*.

EUCALYPTUS globulus ; several large plants killed right out, where they had stood some years, *Chiswick*.

EUCALYPTUS ; on a south wall, suffered much above their temporary winter coverings of grass mats, *Edinburgh*.

EUGENIA Ugni ; unhurt, against a north-west wall, until the April frost, *Exeter*.

EUONYMUS japonicus ; not injured, *Chiswick* ; killed to the ground on a wall with an eastern aspect, *Shiffnal* ; slightly killed on a wall facing the south, *Liverpool* ; lost the leading shoots, *Bicton* ; slightly pinched, *Southampton*.

EUONYMUS japonicus aureus ; killed to the ground, on a wall with an eastern aspect, *Shiffnal*.

EUONYMUS japonicus argenteus ; killed to the ground, on a wall with an eastern aspect, *Shiffnal*.

EUONYMUS angustifolius ; not injured, *Chiswick*.

EUONYMUS Hamiltonianus ; not injured, south wall, *Chiswick* ; killed to the main stem, on a wall facing the south, *Liverpool*.

EUONYMUS fimbriatus ; killed to the ground, on a wall with an eastern aspect, *Shiffnal*.

EUONYMUS echinatus ; killed to the ground, on a wall facing the south, *Liverpool*.

EUONYMUS sarmentosus ; killed to the ground, on a wall facing the south, *Liverpool*.

EURYBIA alpina ; not hurt, *Exeter*.

EURYBIA Gunniana ; injured, *Kew*.

EURYBIA ilicifolia ; injured, *Kew*.

FABIANA imbricata ; slightly injured, *Kew* ; dead, *Shiffnal* ; not hurt, *Exeter* ; quite killed, *Warrington* ; under a south-east wall, entirely unhurt, *Southampton*.

FAGUS antarctica ; perfectly hardy, *Bicton*.

FAGUS Cunninghami ; all dead to the ground, *Kew* ; behind a heap of stones, and raised above the ground, hurt to the level of the stones, uninjured below, *Acton Green* ; rather tender, *Bicton*.

FICUS virgata ; killed down to the ground, but starting strong again, south wall, *Chiswick*.

FIG TREES ; all killed to the ground, *Shiffnal*.

FITZ-ROYA patagonica ; not injured, *Chiswick* ; cut back to the main stem, but recovering, *Acton Green* ; not affected during the winter, *Bayshot* ; stood well, not being injured in the least, *Ware* ; leader killed down—supposed to be hardy, *Alton* ; unhurt, *Rolleston* ; escaped with slight injury, *Congleton* ; not hurt, *Exeter* ; uninjured, *Singleton* ; under a south-east wall, leader killed about five or six inches, *Southampton* ; slightly protected, uninjured. *Bicton*.

FORSYTHIA viridissima ; not injured, *Chiswick* ; perfectly hardy, *Alton* ; not hurt, on a wall with an eastern aspect, *Shiffnal* ; not at all injured, *Warrington* ; entirely unhurt, *Southampton*.

FUCHSIAS ; all killed down to the ground, but starting again strong, *Chiswick*.

GARRYA elliptica ; a few points of the top shoots killed, and some of the outer leaves, *Chiswick* ; greatly injured, *Ware* ; injured, *Bromley* ; slightly injured, *Rolleston* ; browned everywhere, and some branches killed, *Shiffnal* ; nearly killed, *Nottingham* ; not in the least injured, *Windermere* ; uninjured, *Bicton* ; on a south-east wall, untouched, *Southampton*.

* *GARRYA laurifolia* ; killed, *Rolleston* ; killed, *Nottingham*.

GARRYA macrophylla ; not injured, south wall, *Chiswick* ; very much injured in the open border, *Chiswick* ; in a sheltered situation, is uninjured, *Congleton* ; slightly cut, *Exeter* ; uninjured, *Bicton*.

GAULTHERIA nummularia ; scarcely touched, *Congleton*.

GAULTHERIA Shallon ; not in the least injured, *Windermere*.

GAULTHERIA procumbens ; not in the least injured, *Windermere*.

GENISTA candicans ; not injured in any way, south wall, *Chiswick*.

GERANIUM, Scarlet ; under a west wall covered with tan, alive and shooting nicely, *Worcester*.

GLYCINE sinensis ; not injured, south wall, *Chiswick*.

GLYCINE sinensis alba ; not injured, south wall, *Chiswick*.

GLYPTOSTROBUS pendulus ; not injured, *Chiswick* ; uninjured, *Shiffnal*.

GORDONIA pubescens ; not injured, *Chiswick*.

GRABOWSKIA boerhaviaefolia ; killed, *Kew* ; not injured, *Chiswick*.

GREVILLEA rosmarinifolia ; killed, *Shiffnal* ; slightly cut, *Exeter* ; entirely unhurt, *Southampton*, and *Bicton*.

GREVILLEA sulphurea ; not in the least cut, *Exeter* ; entirely unhurt, *Southampton*.

GYNERIUM argenteum ; (Pampas Grass) old leaves browned, growing vigorously, not the least injured, *Chiswick* ; pushing freely, *Congleton*.

HABROTHAMNUS corymbosus ; killed to the ground, *Kew*.

HABROTHAMNUS fasciculatus ; unprotected and against an east wall, has bloomed magnificently, *South Devon*.

HEDERA Helix ; not injured in the least, *Rolleston* ; injured, *Nottingham* ; Irish Ivy much hurt in places, *Rolleston*.

HEIMIA salicifolia ; killed to the ground, *Kew* ; killed in a dry sheltered situation, *Chiswick*.

HELIANTHEMUM formosum ; dead, *Kew*.

HELIANTHEMUM Libanotis ; dead, *Kew*.

HELIANTHEMUM halimifolium ; dead, *Kew*.

HOVENIA dulcis ; killed down to the ground, but starting strong again, south wall, *Chiswick*.

HYDRANGEA quercifolia ; not injured, *Chiswick*.

HYDRANGEA involucrata ; not injured, *Chiswick*.

ILEX latifolia ; very slightly injured in open border, *Chiswick* ; not injured, south wall, *Chiswick* ; a good deal injured, *Shiffnal* ; turned brown in the leaves, *Ossington* ; killed, *Oulton* ; not hurt, *Exeter* ; slightly cut, *Southampton*.

ILEX furcata ; during the winter not affected at all, *Bagshot* ; perfectly hardy, *Alton*.

ILEX cornuta ; killed, *Acton Green* ; during the winter not affected at all, *Bagshot* ; unhurt, *Southampton*.

ILEX perado ; not injured, *Chiswick* ; injured, *Oulton*.

ILEX opaca ; not injured, *Chiswick* ; killed, *Oulton*.

ILEX Aquifolium ; uninjured, *Rolleston* ; lost all their leaves and are much injured, *Shiffnal* ; old strong trees, thirty feet high, have suffered a good deal, many of their branches dead, the leaves quite brown, *Ossington* ; cut, and the leaves turned brown, old strong trees looking brown and sickly, *Ossington* ; the injury is partial : variegated, golden, and many of the common Hollies not at all injured, *Ossington* ; many killed, all more or

less injured, mostly the lower six feet of the trees are quite dead, making nearly all the trees Standards, *Nottingham*; many variegated killed, *Rolleston*.

Ilex vomitoria; much injured, *Kew*.

Ilex Taraga; not affected during the winter, *Bagshot*.

Ilex leptacantha; not affected during the winter, *Bagshot*.

Ilex microcarpa; not affected during the winter, *Bagshot*; killed, *Acton Green*.

Illicium religiosum; slightly cut, *Exeter*; uninjured, *Bicton*.

Illicium anisatum and *floridanum*; uninjured, *Bicton*.

Indigofera decora; killed down to the ground, *Chiswick*.

Indigofera Dosua; killed down to the ground, but starting strong again, south wall, *Chiswick*.

Indigofera; a new species from China, not affected during the winter at all, *Bagshot*.

Indigofera australis; on a south wall, suffered much, above its temporary winter covering of grass mats, *Edinburgh*.

Iris susiana; flowered beautifully, *South Devon*.

Ixias; all safe, *South Devon*.

Jasminum nudiflorum; not injured in open border, nor on south wall, *Chiswick*; uninjured, *Acton Green*; not hurt, on a wall with an eastern aspect (in full bloom at the present time), *Shiffnal*; against a south-east wall, entirely unhurt, *Southampton*.

Jasminum revolutum; killed to the ground, in the open border, but starting strong again; not injured, on south wall, *Chiswick*; killed down, *Oulton*.

Jasminum affine; not injured, south wall, *Chiswick*.

Jasminum Wallichianum; not injured, south wall, *Chiswick*.

Juniperus gossainthania; damaged, *Bayfordbury*; somewhat injured, *Alton*.

Juniperus Bedfordiana; killed, *Alton*; uninjured, *Shiffnal*; uninjured, *Singleton*; uninjured, *Bicton*.

Juniperus phoenicea; some of the smaller branches killed, but not more than happens in other winters, *Chiswick*; somewhat injured, *Alton*.

Juniperus chinensis; uninjured, *Shiffnal*; not injured, *Nottingham*; not injured, *Chiswick*.

Juniperus flaccida; slightly injured in smaller branches; not injured, on a dry bank where protected from north-east winds, *Chiswick*; killed, *Alton*; uninjured, *Bicton*.

Juniperus excelsa; (Crimea plant) not injured, *Chiswick*; uninjured, *Shiffnal*; uninjured, *Nottingham*.

JUNIPERUS lycia; uninjured, a little raised, *Acton Green*; somewhat injured, *Alton*.

JUNIPERUS macrocarpa; slightly injured in some of the smaller branches, *Chiswick*; killed, *Alton*.

JUNIPERUS bermudiana; dead, *Kew*; uninjured at foot of south wall, *Chiswick*.

JUNIPERUS japonica; not injured, *Chiswick*.

JUNIPERUS mexicana; not injured, *Chiswick*; uninjured, *Bicton*.

JUNIPERUS sphaerica; not affected during the winter, *Bagshot*.

JUNIPERUS tetragona; killed, *Chiswick*; somewhat injured, *Alton*; killed, *Congleton*; dead, *Shiffnal*; uninjured, *Singleton*.

JUNIPERUS squamata; not injured, *Chiswick*; uninjured, *Shiffnal*.

JUNIPERUS echiniformis; killed, *Alton*; killed, *Bicton*.

JUNIPERUS communis; injured, *Nottingham*.

JUNIPERUS commuuis canadensis; killed, *Bicton*.

JUNIPERUS recurva; uninjured, *Nottingham*, *Chiswick*, *Singleton*, and *Bicton*.

JUNIPERUS Sabina; much injured, *Nottingham*.

JUNIPERUS oblonga pendula; uninjured, *Congleton*; uninjured, *Bicton*.

JUNIPERUS oxycedrus; killed, *Bicton*.

JUNIPER, blue, Himalaya; one plant has nuts or berries upon it of the size and colour of green gooseberries, *Congleton*.

KALMIAS; are looking as if there had been no winter on them, *Windermere*.

LAURUS regalis; partially injured in the foliage, *Chiswick*; foliage browned, *Bagshot*; not affected during the winter, *Bagshot*; many killed, *Nottingham*; quite safe, *Congleton*.

LAURUS nobilis; cut down to the ground in 1823, again in 1838, scarcely injured last winter, *Kew*; not injured, leaves a little discoloured, *Chiswick*; leaves only half killed, *Acton Green*; killed to the ground, *Alton*; nearly killed, *Rolleston*; killed to the ground, *Ossington*; killed to the ground everywhere, *Shiffnal*; killed, *Nottingham*; not injured, *Watnal*, *Nottingham*; killed down, *Oulton*; nearly perished, *Congleton*; leaves singed as if by fire, in the open ground, *Liverpool*; killed to the root, *Warrington*; slightly pinched, but none seriously, *Southampton*.

*LAURUS Sassafra*s; uninjured, *Shiffnal*.

LAGERSTRÆMIA indica; cut back to old wood, south wall, *Chiswick*; not affected during the winter, *Bagshot*.

LARDIZABALA biternata; cut down, but now pushing from the

roots, *Shiffnal*; in full foliage and unhurt, against a north-west wall, *Exeter*.

LAVENDER; suffered considerably, *Warrington*.

LEYCESTERIA formosa; not injured, *Chiswick*; killed to the ground, *Shiffnal*.

LIBOCEDRUS chilensis; not injured, *Chiswick*; not affected during the winter, *Bagshot*; brown on the south side, *Ware*; altogether unscathed, *Alton*; slightly injured, *Rolleston*; injured, *Nottingham*; escaped with slight injury, *Congleton*; hardy and highly ornamental, though some of its later autumnal growth is slightly injured, *Congleton*; perfectly hardy, *South Devon*; not hurt, *Exeter*; quite safe, *Singleton*; uninjured, *Southampton*.

LIBOCEDRUS Doniana; altogether unscathed, *Alton*; protected by branches, uninjured, *Singleton*.

LIGUSTRUM ovalifolium; not injured, *Chiswick*.

LIGUSTRUM japonicum; not injured, *Chiswick*; not in the least cut, *Exeter*.

LIGUSTRUM lucidum; very slightly injured, but lost nearly all its leaves, *Chiswick*; killed, *Rolleston*; killed, *Ossington*.

LIGUSTRUM vulgare; lost its leaves, otherwise uninjured, *Rolleston*; injured, *Nottingham*.

LILIUM lancifolium album; not injured in the peat borders, *Chiswick*; got well through the winter without any other protection than wooden shutters open at the ends, and a few coal ashes strewed over its roots, *Congleton*.

LILIUM Wallichianum; appears to be more tender than other lilies, it having died under the following treatment: placed with others, under wooden shutters open at the ends, and coal ashes strewed over the roots, *Congleton*.

LILIUM californicum; got well through the winter without any other protection than wooden shutters open at the ends, and a few coal ashes strewed over its roots, *Congleton*.

LILIUM sanguineum; got well through the winter without any other protection than wooden shutters open at the ends, and a few coal ashes strewed over its roots, *Congleton*.

LILIUM Catesbæi; got well through the winter without any other protection than wooden shutters open at the ends, and a few coal ashes strewed over its roots, *Congleton*.

LILIUM tenuifolium; got well through the winter without any other protection than wooden shutters open at the ends, and a few coal ashes strewed over its roots, *Congleton*.

LILIUM Thomsonianum; got well through the winter without

any other protection than wooden shutters open at the ends, and a few coal ashes strewed over its roots, *Congleton*.

LILIUM colchicum ; got well through the winter without any other protection than wooden shutters open at the ends, and a few coal ashes strewed over its roots, *Congleton*.

LILIUM testaceum ; got well through the winter without any other protection than wooden shutters open at the ends, and a few coal ashes strewed over its roots, *Congleton*.

LILIUM venustum ; got well through the winter without any other protection than wooden shutters open at the ends, and a few coal ashes strewed over its roots, *Congleton*.

LILIUM giganteum ; got well through the winter without any other protection than wooden shutters open at the ends, and a few coal ashes strewed over its roots, *Congleton*.

LIRIODENDRUM tulipifera ; slightly injured, *Nottingham*.

LOMATIA longifolia ; killed, *Kew*.

LOMATIA ferruginea ; cut back about two feet in the open ground, uninjured, planted amongst the shrubs, *Exeter*.

LOMATIA tinctoria ; killed, *Kew*.

LONICERA discolor ; not injured, *Chiswick*.

LONICERA diversifolia ; not injured, south wall, *Chiswick*.

LONICERA angustifolia ; not injured, *Chiswick*.

LONICERA fragrantissima ; not injured, *Chiswick*.

LYCOPodium Willdenovi ; not affected during the winter, *Bagshot*.

MACLURA aurantiaca ; small branches killed on a wall facing the south, *Liverpool*.

MAGNOLIA grandiflora ; not injured, south wall, *Chiswick* ; uninjured, *Exeter* ; a fine plant ten feet by twenty-seven feet wide, on south wall, apparently dead, *Shiffnal*.

MAGNOLIA conspicua ; not injured, south wall, *Chiswick* ; uninjured, *Exeter*.

MAGNOLIA fuscata ; against a wall, uninjured, *Bicton*.

MAGNOLIA macrophylla ; not hurt, on a wall with an eastern aspect, *Shiffnal*.

MAGNOLIA auriculata ; uninjured, *Exeter* and *Chiswick*.

MAGNOLIA purpurea ; on a south wall, is in full flower, *Shiffnal*.

MAGNOLIA obtusifolia ; not more injured than in ordinary winters (on a south wall), *Shiffnal*.

MAGNOLIA Soulangeana ; uninjured, *Exeter*.

MAGNOLIA Thompsoni ; uninjured, *Exeter* and *Chiswick*.

MAGNOLIAS; suffered more than usual, though they have sustained no permanent injury, *South Devon*.

MAYTENUS chilensis; slightly injured, *Kew*; partially cut back, south wall, *Chiswick*.

MEDICAGO arborea; much injured, *Kew*; killed, south wall, *Chiswick*.

MENISPERMUM laurifolium; killed, *Kew*.

METROSIDEROS tomentosa; killed, *Kew*.

METROSIDEROS florida; killed, *Kew*.

METROSIDEROS saligna; small branches killed, *Kew*.

MORINA longifolia; not in the least injured, *Chiswick*; uninjured, *Acton Green*.

MOUTANS, Chinese; escaped injury during the winter and spring, *Bagshot*, and *Chiswick*.

MYRICA californica; not injured, except a little at the points of the unripe wood, *Chiswick*; uninjured, *Acton Green*; foliage slightly injured in a young plant placed out of doors in the autumn, *Bagshot*; dead, *Alton*.

MYRSINE africana; killed down to the ground, but starting strong again, south wall, *Chiswick*.

MYRTUS communis; leaves browned (killed in 1838), *Kew*; cut back to old wood, but starting strong again, south wall, *Chiswick*; on a south wall, suffered much above their temporary winter coverings of grass mats, *Edinburgh*; against a south-east wall, leaves killed, wood unhurt, *Southampton*.

NANDINA domestica; injured, *Kew*; killed, south wall, *Chiswick*.

NEILLIA thyrsoflora; killed to the ground, but starting strong again, *Chiswick*.

NOTELÆA ligustrina; much injured, *Kew*.

OLEA sp. Japan; a fine evergreen and large plant, which stood several years, killed down to the ground, but starting again, south wall, *Chiswick*.

OLIVE of Nikita; killed back to the old wood, *Chiswick*.

ORNUS floribunda; not injured, south wall, *Chiswick*; slightly injured, *Kew*.

OZOTHAMNUS rosmarinifolius; cut to the ground, but shooting again, *Exeter*; uninjured, *Bicton*.

PANAX horrida; killed to the ground, *Chiswick*.

PASSIFLORA cærulea; killed down, *Oulton*.

PAVIA californica; not injured in the least, *Chiswick*; not hurt, *Exeter*.

PAVIA indica; not injured, *Chiswick*.

PAWLOVIA imperialis ; lost its leading branches, *Bicton*.

PEACH, double red Chinese ; not injured, *Chiswick*.

PEACH, double white Chinese ; not injured, *Chiswick*.

PERNETTYA ciliaris ; partially injured in young wood, in a peat border, and starting freely again, *Chiswick*.

PERNETTYA mucronata speciosa ; not hurt, *Exeter*.

PHILADELPHUS mexicanus ; killed, nearly to the ground, but again starting vigorously, south wall, *Chiswick*.

PHILADELPHUS triflorus ; injured, and cut back one-third, *Chiswick*.

PHILIPPODENDRON regium ; stood the winter, against a wall, *South Devon* ; not hurt, *Exeter*.

PHILLYREA obliqua ; uninjured, *Rolleston*.

PHILLYREA media ; partially hurt, *Rolleston* ; trees twenty years old, killed, *Nottingham*.

PHILLYREA angustifolia, killed, *Rolleston* ; trees twenty years old, killed, *Nottingham*.

PHILLYREA latifolia ; killed, *Oulton*.

PHILLYREAS ; none of them injured, *Chiswick*.

PHORMIUM tenax ; cut to the ground, *Shiffnal* ; cut, but not killed, *Exeter*.

PHOTINIA glabra ; not injured, although away from the wall, south wall, *Chiswick* ; injured, though sheltered by a wall on the west ; north, by buildings and trees ; east, by shrubs, *Shiffnal* ; injured, *Bromley*.

PHOTINIA arbutifolia ; killed, *Chiswick*.

PHOTINIA dentata, injured, though sheltered by a wall on the west ; north, by buildings and trees ; east, by shrubs, *Shiffnal*.

PHYLLOCLADUS asplenifolius ; slightly protected, uninjured, *Bicton*.

PHYLLOCLADUS trichomanoides ; slightly protected, uninjured, *Bicton*.

PINUS Cembra ; not injured, *Ossington* ; not injured, *Nottingham*.

PINUS Llaveana ; browned, *Kew* ; very slightly injured in a few of the smaller branches, *Chiswick* ; perfectly green, suffered nothing whatever from the frost, *Alton* ; injured, *Oulton* ; killed, *Congleton* ; untouched, *Singleton*.

PINUS Devoniana ; dead, *Kew* ; nearly killed, *Chiswick* ; destroyed some years since, *Dropmore* ; somewhat browned, *Alton* ; not hurt, *Exeter* ; leaves browned, *Singleton*.

PINUS Gerardiana ; browned, *Kew* ; not injured, *Chiswick* ;

unhurt, *Bayfordbury*; somewhat browned, *Alton*; leaves browned, *Singleton*.

PINUS Grenvillæ; dead, *Kew*; killed, *Chiswick*; destroyed some years since, *Dropmore*; dead, *Alton*; foliage browned, and leader cut, *Exeter*; killed, *Bicton*.

PINUS filifolia; killed, *Kew*; killed, *Chiswick*; dead, *Alton*; killed, *Bicton*.

PINUS tuberculata; not injured, *Chiswick*; quite uninjured, *Bayfordbury*; perfectly green, suffered nothing whatever from the frosts, *Alton*.

PINUS palustris; only injured in the long foliage, *Chiswick*; unhurt, *Bayfordbury*; perfectly green, suffered nothing whatever from the frost, *Alton*.

PINUS Sabiniana; not injured, *Chiswick*; lower branches nearly all killed, top shoots uninjured, *Dropmore*; perfectly green, suffered nothing whatever from the frosts, *Alton*.

PINUS longifolia; dead, *Kew*; killed, *Ware*; killed, *Bicton*.

PINUS leiophylla; killed to the ground, but sending out young shoots from the bottom, *Chiswick*; killed, *Ware*; uninjured, *Bicton*.

PINUS apulcensis; many trees become unsightly, *Kew*; very much injured, (nearly killed all the smaller branches,) but growing again, *Chiswick*; destroyed some years since, *Dropmore*; much injured, *Bayfordbury*; very brown, *Ware*; perfectly green, suffered nothing whatever from the frost, *Alton*; killed, *Rolleston*.

PINUS Hartwegi; dead, *Kew*; killed to the ground, but sending out young shoots from the bottom, *Chiswick*; not affected during the winter, *Bagshot*; destroyed some years since, *Dropmore*; killed, *Bayfordbury*; killed, *Ware*; perfectly green, suffered nothing whatever from the frost, *Alton*; quite unscathed, *Congleton*; uninjured, *Bicton*; leaves browned, *Singleton*.

PINUS macrophylla; slightly injured in the foliage, the long leaves being bent down by the snow, *Chiswick*; killed, *Bayfordbury*; killed, *Ware*; leaves browned, *Singleton*.

PINUS patula; some killed and others nearly so, *Kew*; very much injured, but recovering, *Chiswick*; a fine tree facing the east has been much cut up, *Dropmore*; slightly injured, in a sheltered place, *Dropmore*; completely dead, and black in the inner bark down to the very root, *Bayfordbury*; points injured, and is very brown, *Ware*; somewhat browned, *Alton*; killed, *Rolleston*; injured, *Oulton*; killed, *Congleton*; foliage browned, and some shoots killed, *Exeter*; leaves browned, *Singleton*; slightly injured, *Bicton*.

PINUS radiata; is only slightly injured in the points of the leaves, *Chiswick*; not affected during the winter, *Bagshot*; perfectly green, suffered nothing whatever from the frost, *Alton*; injured, *Oulton*; leaves browned, *Singleton*.

PINUS macrocarpa; not injured, *Chiswick*; a few of the lower branches are killed, and the leaves much browned, *Dropmore*; perfectly green, suffered nothing whatever from the frost, *Alton*; not hurt, *Exeter*; a fine specimen, forty-six feet in height, uninjured, *Bicton*.

PINUS Pinea; young trees from six to eight feet high, uninjured; old trees injured in the year 1838, have again been much browned, *Dropmore*; injured, *Nottingham*; so very much injured, nearly killed, *Chiswick*; killed, *Congleton*.

PINUS Benthamiana; not injured, but a few of the points of the leaves browned, *Chiswick*; not affected during the winter, *Bagshot*; perfectly green, suffered nothing whatever from the frosts, *Alton*; quite unscathed, *Congleton*; not hurt, *Exeter*; uninjured, *Bayfordbury*; untouched, *Singleton*.

PINUS insignis; many trees browned, *Kew*; one plant nearly killed, another very little injured, *Chiswick*; during the winter not affected at all, *Bagshot*; old plants have not had a leaf browned, but young plants, one to three feet high, have had their leaders killed, *Dropmore*; unhurt, *Bayfordbury*; perfectly green, suffered nothing whatever from the frost, *Alton*; entirely killed, in a low situation, *Alton*; ten feet high, dead, *Shiffnal*; much injured, *Rolleston*; not injured, *Ossington*; injured, *Nottingham*; injured, *Oulton*; some killed, others of the same have escaped, *Congleton*; large plant not injured, *Exeter*; not in the least injured, *Windermere*; leaves browned, *Singleton*; now fifty feet in height, has several times lost its leader, *Bicton*.

PINUS Teocote; dead, *Kew*; slightly injured in some of the smaller branches, *Chiswick*; on the east side only slightly injured, *Dropmore*; presents nearly the same appearance as *P. patula*, the stem of which is completely dead and black in the inner bark down to the very root, *Bayfordbury*; dead, *Alton*; killed, *Congleton*; uninjured, *Bicton*.

PINUS Lambertiana; sheltered, and on the *P. Cembra* stock is unhurt, *Dropmore*; during the winter not affected at all, *Bagshot*; slightly touched on the east side, *Dropmore*; perfectly green, suffered nothing whatever from the frost, *Alton*; slightly injured, *Nottingham*; quite unscathed, *Congleton*; not hurt, *Exeter*, and *Chiswick*.

Pinus excelsa; not injured, a few of the points of the leaves browned, *Chiswick*; somewhat browned, *Alton*; not injured, *Ossington*; slightly injured, *Nottingham*.

Pinus Lindleyana; not injured, except a few points of the leaves on the north-east side, *Chiswick*; not affected during the winter, *Bagshot*; quite uninjured, *Bayfordbury*; perfectly green, suffered nothing whatever from the frost, *Alton*; not injured, *Ossington*; quite unscathed, *Congleton*.

Pinus Russelliana; very much injured, particularly on the north-east side, but recovering, leaves very much injured, *Chiswick*; slightly browned, *Bagshot*; shoots on the east side mostly killed in exposed situations, but, where sheltered, is not much hurt, *Dropmore*; only brown in the points of the leaves. *Bayfordbury*; not injured, *Ossington*; killed, *Congleton*; cut, and the leader injured, but recovering, *Exeter*; leaves browned, *Singleton*; uninjured, *Bicton*.

Pinus canariensis; dead, *Kew*; killed down to the ground, *Alton*.

Pinus tuberculata(?); not affected during the winter, *Bagshot*; a few branches only have been damaged, and one plant is not injured in the least, *Dropmore*; perfectly green, suffered nothing whatever from the frost, *Alton*; some killed, others of the same have escaped, *Congleton*; leaves browned, *Singleton*; twenty-five feet in height, appears as hardy as *P. insignis*, *Bicton*. (This is returned under the name *P. californica*.)

Pinus Massoniana; dead, *Kew*; quite unscathed, *Congleton*.

Pinus Wincesteriana; dead, *Kew*; killed, *Chiswick*; killed, *Bagshot*; much injured, doubtful if it will recover, *Ware*; dead, *Alton*; foliage browned, *Exeter*.

Pinus Fremontiana; not injured, *Chiswick*; quite unscathed, *Congleton*; plant one foot high not hurt, *Exeter*.

Pinus muricata; not injured, *Chiswick*; not affected during the winter, *Bagshot*; quite uninjured, *Bayfordbury*; perfectly green, suffered nothing whatever from the frost, *Alton*; quite unscathed, *Congleton* and *Exeter*, where it is called *P. Edgariana*.

Pinus Montezumæ; not injured, *Chiswick*; not affected during the winter, *Bagshot*; destroyed some years since, *Dropmore*; quite uninjured, *Bayfordbury*; perfectly green, suffered nothing whatever from the frost, *Alton*; killed, *Rolleston*; dead, *Shiffnal*; quite unscathed, *Congleton*; not hurt, *Exeter*; leaves browned, *Singleton*.

Pinus monticola; not affected during the winter, *Bagshot*;

perfectly green, suffered nothing whatever from the frost, *Alton*; quite unscathed, *Congleton*; not injured, *Chiswick*.

PINUS Ayacahuite; slightly injured in the foliage, *Chiswick*; not affected during the winter, *Bagshot*; somewhat browned, *Alton*; quite unscathed, *Congleton*.

PINUS cembroides; is injured slightly in the foliage, *Chiswick*; perfectly green, and suffered nothing whatever from the frost, *Alton*; quite unscathed, *Congleton*; slightly hurt, *Singleton*.

PINUS Gordoniana; killed, *Chiswick*; perfectly green, suffered nothing whatever from the frost, *Alton*; killed, *Bicton*.

PINUS halepensis; much injured (killed in 1838), *Kew*; nearly killed, or quite so in some cases, *Chiswick*; killed, *Bagshot*; somewhat browned, *Alton*; killed, *Oulton*; untouched, *Singleton*.

PINUS Banksiana; perfectly green, suffered nothing whatever from the frost, *Alton*.

PINUS sinensis; dead, *Kew*.

PINUS osteosperma; not injured, except the points of the leaves a little browned, *Chiswick*.

PINUS Peuce; not injured, *Chiswick*.

PINUS sylvestris genevensis; lost all its leaves, but little injured otherwise, *Chiswick*.

PINUS Orizabæ; is all but killed, a very little vitality left in the plant, *Chiswick*.

PINUS persica; not injured, *Chiswick*.

PINUS Fordi; not affected during the winter, *Bagshot*.

PINUS, unknown species from Mexico of fifteen years' growth; much injured, *Bayfordbury*.

PINUS pseudo-strobus; killed, *Ware* and *Chiswick*.

PINUS occidentalis; perfectly green, suffered nothing whatever from the frost, *Alton*; killed, *Bicton*.

PINUS oocarpa; uninjured, *Bicton*.

PINUS nivea; dead, *Alton*.

PINUS Brutia; perfectly green, suffered nothing whatever from the frost, *Alton*; uninjured, *Chiswick*.

PINUS ponderosa; perfectly green, suffered nothing whatever from the frost, *Alton*.

PINUS Pinaster; not injured, *Nottingham*.

PINUS Laricio; slightly injured, *Nottingham*; uninjured, *Chiswick*.

PIPTANTHUS nepalensis; injured, *Oulton*; killed, *Chiswick*.

PISTACIA Terebinthus; killed down to the ground in 1838—injured but slightly by last winter's cold, *Kew*.

PISTACIA mutica ; killed, south wall, *Chiswick*.

PISTACIA vera, and *Lentiscus* ; much cut, *Bicton*.

PITTOSPORUM tenuifolium ; killed, *Kew*.

PITTOSPORUM bicolor ; slightly cut in the foliage, otherwise not injured, *Chiswick*.

PITTOSPORUM glabratum ; killed, after living out two winters in a dry situation, *Chiswick*.

PITTOSPORUM Tobira ; uninjured, *Singleton* ; killed to the ground, *Bicton*.

PODOCARPUS mucronata ; not injured, *Chiswick* ; killed, *Bicton*.

PODOCARPUS Totarra ; scarcely injured, south wall, *Chiswick* ; slightly protected, unhurt, *Bicton*.

PODOCARPUS nubigena ; not affected during the winter, *Bagshot*.

PODOCARPUS Makoyi ; not affected during the winter, *Bagshot*.

PODOCARPUS chilina ; not affected during the winter, *Bagshot*.

PODOCARPUS montana ; injured, *Bagshot*.

PODOCARPUS Purdiana ; killed, *Bicton*.

POLYANTHUSES ; in the height of perfection, *Windermere*.

POLYGONUM implexum ; killed to the ground, *Kew*.

PRUNUS nipalensis ; not injured, *Chiswick*.

PRUNUS sinensis, *double pink* ; killed, south wall, *Chiswick*.

PRUNUS sinensis, *single* ; cut back very much, south wall, *Chiswick*.

PSORALEA bituminosa ; one plant killed, another nearly so, *Kew*.

PUNICA granatum ; killed down to the ground in 1838,—injured but slightly by last winter's cold, *Kew* ; not injured, south wall, *Chiswick*.

PUNICA granatum, *double white* ; injured, *Shiffnal*.

PYRUS vestita ; not injured, *Chiswick*.

PYRUS variolosa ; very much cut back, and injured, south wall, *Chiswick*.

QUERCUS, *Mexican* ; all killed, *Chiswick*.

QUERCUS sclerophylla ; killed, *Acton Green* ; injured, *Bagshot* ; killed to the ground, *Congleton*, and *Bicton*.

QUERCUS Ilex ; some not the least injured, and others but slightly, by the last winter's frost,—much injured in 1838, *Kew* ; not injured, *Chiswick* ; foliage destroyed and injured, *Rolleston* ; thirty-two feet six inches high, fifty-four feet diameter of branches, trunk seven feet in circumference, three feet from the ground, injured very much, *Shiffnal* ; foliage entirely fallen off, *Shiffnal* ;

many killed, some plants fifty years old dead, *Nottingham* ; lost all their leaves in the open ground, *Liverpool*.

QUERCUS *gramuntia* ; killed, *Rolleston* ; killed, *Oulton* ; untouched, *Chiswick*.

QUERCUS *inversa* ; killed, *Acton Green* ; not affected during the winter, *Bagshot*.

QUERCUS *Suber* ; leaves very much browned, and deciduous, otherwise not injured, *Chiswick* ; injured, *Bromley* ; much injured, *Nottingham*.

QUERCUS *Branti*, and other Kurdistan oaks ; not injured by the winter, but very much injured by the frost on April 24, *Chiswick* ; injured, *Oulton* ; quite safe, *Congleton*.

QUERCUS *Xalapensis* ; killed, south wall, *Chiswick*.

QUERCUS *dealbata* ; partially injured in foliage, south wall, *Chiswick* ; uninjured, *Bicton*.

QUERCUS *australis* ; not injured, *Chiswick*.

QUERCUS *Cookii* ; leaves injured only, *Chiswick*.

QUERCUS *insignis* ; large plant killed, *Chiswick*.

QUERCUS *glabra* ; not affected during the winter, *Bagshot* ; not hurt, *Exeter* or *Bicton*.

QUERCUS *macrophylla* ; leaves very much blotched and injured, *Ware*.

QUERCUS *laurifolia* ; dead to the ground, *Shiffnal*.

QUERCUS *mongolica* ; uninjured, *Shiffnal*.

QUERCUS *palustris* ; dead to the ground, *Shiffnal* ; injured, *Oulton*.

QUERCUS *coccifera* ; a small plant, escaped unhurt, *Shiffnal*.

QUERCUS *Lucombeana* ; putting forth buds, *Shiffnal*.

RETINOSPORA *squamosa* ; two plants killed, *Chiswick*.

RETINOSPORA *ericoides* ; not affected during the winter, *Bagshot* ; killed, *Chiswick*.

RHAMNUS *oleaeifolius* ; points of shoots injured, *Chiswick*.

RHAMNUS *croceus* ; perfectly hardy, *South Devon*.

RHUS sp. *India* ; not injured, south wall, *Chiswick*.

RHUS *lobata* ; not injured, south wall, *Chiswick*.

RHODODENDRON *Thomsoni*, Sikkim ; suffered but little from the winter's cold, *Kew* ; survived the winter perfectly uninjured, *Bagshot* ; borne the winter satisfactorily in peat, but is quite lost in loam, *Canterbury*.

RHODODENDRON *ciliatum*, Sikkim ; suffered but little by the winter's cold, *Kew* ; not injured, flower-buds killed by spring frost, *Chiswick* ; survived the winter perfectly unin-

jured, *Bagshot*; stood the winter in peat, but died in loam, *Canterbury*.

RHODODENDRON fulgens, Sikkim; suffered but little from the winter's cold, *Kew*; survived the winter perfectly uninjured, *Bagshot*; as hardy as *R. ponticum* in peat, but in loam has suffered a little, *Canterbury*.

RHODODENDRON niveum, Sikkim; proved itself able to resist our variable clime, *Canterbury*; stood the winter well, *Congleton*.

RHODODENDRON glaucum, Sikkim; suffered but little by the winter's cold, *Kew*; survived the winter perfectly uninjured, *Bagshot*; passed the winter unscathed without any other covering than the snow, *Canterbury*; stood the winter well, retained its flower-buds in spite of January and April frosts, *Congleton*.

RHODODENDRON Falconeri, Sikkim; suffered but little from the winter's cold, *Kew*; survived the winter perfectly uninjured, *Bagshot*.

RHODODENDRON cinnabarinum, Sikkim; suffered but little from the winter's cold, *Kew*; not injured, *Chiswick*; survived the winter perfectly uninjured, *Bagshot*.

RHODODENDRON campylocarpum, Sikkim; survived the winter perfectly uninjured, *Bagshot*; passed the winter unscathed, *Canterbury*.

RHODODENDRON Edgeworthi; killed, lived out the previous winter, *Chiswick*; all but killed, *Bagshot*; appears to shrink from our cold damp atmosphere, and with us positively refuses to be a living habitant of the garden, in either soil or situation, *Canterbury*.

RHODODENDRON æruginosum, Sikkim; survived the winter perfectly uninjured, *Bagshot*.

RHODODENDRON Wighti, Sikkim; survived the winter perfectly uninjured, *Bagshot*.

RHODODENDRON Wallichii, Sikkim; survived the winter perfectly uninjured, *Bagshot*.

RHODODENDRON lepidum, Sikkim; died in cold pits, *Canterbury*.

RHODODENDRON, very fine Scarlet, Sikkim; stood the winter in peat, but can scarcely be said to be alive, certainly not happy in loam, *Canterbury*.

RHODODENDRON calyculatum, Sikkim; survived the winter perfectly uninjured, *Bagshot*.

RHODODENDRON barbatum; survived the winter perfectly uninjured, *Bagshot*.

RHODODENDRON lancifolium, Sikkim ; survived the winter perfectly uninjured, *Bagshot*.

RHODODENDRON anthopogon, Sikkim ; survived the winter perfectly uninjured, *Bagshot*.

RHODODENDRON setosum, Sikkim ; survived the winter perfectly uninjured, *Bagshot*.

RHODODENDRON cinnamomeum ; unhurt, *Exeter*.

RHODODENDRON ponticum ; in the open ground, suffered in some instances, *Liverpool* ; generally injured, and in many instances killed, *Chatsworth*.

RHODODENDRON lepidotum, Sikkim ; survived the winter perfectly uninjured, *Bagshot*.

RHODODENDRON arboreum, Sikkim ; completely killed in some localities in the garden, *Kew* ; cut, but not killed, *Exeter*.

RHODODENDRON Campbelliæ, Sikkim ; suffered but little from the winter's cold, *Kew*.

RHODODENDRON æruginosum, Sikkim ; proved itself able to resist our clime, having had no other covering but snow, *Canterbury*.

RHODODENDRON anthopogon, Sikkim ; died in cold pits, *Canterbury*.

RHODODENDRON setosum, Sikkim ; died in cold pits, *Canterbury*.

RHODODENDRON cordatum, Sikkim ; stood the winter in peat, but can scarcely be said to be alive, certainly not happy in loam, *Canterbury*.

RHODODENDRON lanatum, Sikkim ; survived the winter perfectly uninjured, *Bagshot*.

RHODODENDRON campanulatum ; injured in foliage, *Chiswick* ; unhurt, *Exeter*.

RHODODENDRONS ; many killed, and even the Pontic varieties injured, *Nottingham* ; suffered much, some large plants quite killed, *Warrington* ; are looking as if there had been no winter on them, *Windermere*.

RHODODENDRONS, Hybrid ; injured, *Oulton* ; all more or less injured in the open ground, *Liverpool* ; Hybrid (bred from *R. arboreum*), many completely killed, *Kew* ; none injured, *Chiswick*.

RHODODENDRONS, Scarlet Hybrid ; without protection looking well, and are now opening their flowers, April 7, *Windermere*.

RIBES acuminatum ; not injured, south wall, *Chiswick*.

RIBES speciosum ; uninjured and flowering very freely, *Chiswick*.

RIBES glutinosum ; not injured, *Chiswick*.

RIBES glaciale ; not injured, *Chiswick*.

RIBES malvaceum ; killed to the ground, *Shiffnal*.

ROSMARINUS officinalis ; much injured (killed in 1838), *Kew*.

ROSA Banksiæ ; killed down to the ground in 1838 ; injured but slightly by last winter's cold, *Kew* ; slightly cut in young shoots, south wall, *Chiswick*.

ROSA Banksiæ, white ; not injured, south wall, *Chiswick*.

ROSE, Macartney ; on a south wall, killed to within an inch of the ground, *Worcester* ; uninjured, *Chiswick*.

ROSES, China and Tea-scented ; many killed, *Nottingham*.

ROSES, Tender ; all killed, *Oulton*.

RUBUS trilobus (Mexico) ; not injured, south wall, *Chiswick*.

RUSCUS racemosus ; not injured, *Chiswick* ; much injured, *Nottingham*.

SALIX japonica ; not injured, south wall, *Chiswick*.

SAMBUCUS glauca (California) ; not injured, *Chiswick*.

SANTOLINA Chamæcyparissias ; not injured, *Chiswick*.

SAXO-GOTHEA conspicua ; is scarcely alive, but not quite killed, although hopeless, *Chiswick* ; cut back to the main stem, but recovering, *Acton Green* ; not affected during the winter, *Bagshot* ; stood well, not being injured in the least, *Ware* ; perfectly hardy, *Alton* ; unhurt, *Rolleston* ; escaped with slight injury, *Congleton* ; not hurt, *Exeter* ; uninjured, *Singleton* ; promises to prove as hardy as any of the Yews, *Bicton*.

SKIMMIA japonica ; uninjured in anyway till April 25th, *Bagshot* ; sheltered from the north and east, uninjured, *Southampton*.

SMILAX, China ; not injured, south wall, *Chiswick*.

SMILAX maculata ; cut a good deal, but starting strong again, south wall, *Chiswick*.

SOLANUM crispum ; much injured, *Kew* ; not injured, south wall, *Chiswick* ; killed on a wall facing the south, *Liverpool* ; uninjured, *Bicton*.

SOLANUM jasminoides ; one plant killed to the ground, another more sheltered not injured, *Kew* ; killed, bark a good deal, south wall, *Chiswick* ; uninjured, *Bicton*.

SPARAXIS ; all safe, *South Devon*.

SPARTIUM Ætneuse ; not injured in the least, south wall, *Chiswick*.

SPIRÆA Reevesiana ; not injured, *Chiswick* ; uninjured, *Acton Green*.

SPIRÆA Lindleyana ; not injured, *Chiswick* ; injured a little, *Acton Green* ; killed to the ground, *Shiffnal*.

SPIRÆA pubescens ; tops of all the young shoots killed, otherwise uninjured, *Chiswick*.

SPIRÆA *cana* ; not injured, *Chiswick*.

SPIRÆA *Blumei* ; not injured, *Chiswick*.

SPIRÆA *vacciniifolia* ; killed to near the ground, but starting vigorously, *Chiswick*.

SPIRÆA *prunifolia* ; uninjured, *Acton Green*.

STAUNTONIA *latifolia* ; cut down, but now pushing from the roots, *Shiffnal* ; unhurt against a south wall, *Exeter*.

SWAINSONIA *galegifolia* ; killed down, *Oulton*.

SWAMMERDAMIA *antennaria* ; some of the branches killed back, otherwise uninjured, *Chiswick*.

SYMPLOCOS *japonica* ; not affected during the winter, *Bagshot*.

SYRINGA *Emodi* ; not injured, *Chiswick*.

TASMANNIA *aromatica* ; uninjured, *Bicton*.

TAXODIUM *sempervirens* ; browned, *Kew* ; not injured, *Chiswick* ; a little raised, very little injured, *Acton Green* ; leaders and tips of branches destroyed, *Bagshot* ; a few branches slightly hurt towards the top, but near the ground they are not touched, *Dropmore* ; stood the winter unhurt, *Bagfordbury* ; brown, many of the tips of the shoots have been killed, *Ware* ; slightly injured, *Rolleston* ; eastern exposure, a fine plant seventeen feet high, and other small ones, comparatively uninjured, the foliage being only a little browned, *Shiffnal* ; western exposure, much injured, all the foliage dead, though a few buds are bursting at the present time, *Shiffnal* ; turned very brown, but not killed, *Ossington* ; scarcely injured, *Nottingham* ; slightly injured, *Oulton* ; foliage browned, and leaders of some plants killed, *Exeter* ; lost the top of its leader, and is brown in patches, *Alton* ; suffered a little, *Singleton* ; uninjured, *Bicton* ; slightly cut, *Southampton*.

TAXUS *baccata* ; in some places slightly affected, *Rolleston* ; some injured, *Nottingham*.

TAXUS *elegantissima* ; young shoots cut off, *Alton* ; untouched, *Singleton*.

TAXUS *Dovastoni* ; young shoots cut off, *Alton* ; untouched, *Singleton*, and *Chiswick*.

TAXUS *monstrosa* ; during the winter not affected at all, *Bagshot*.

THEA *Assamica* ; uninjured, *Chiswick*.

THEA *viridis* (Tea plant) ; killed to the ground on a wall with an eastern aspect, *Shiffnal* ; under a north-west wall, uninjured, *Southampton* ; a large plant, eight feet high, and as much through, uninjured, *Bicton*.

THUJA *aurea* ; not injured, *Chiswick* ; a few branches killed,

Bagshot; unhurt, *Alton*; escaped unhurt, *Shiffnal*; some are killed, *Rolleston*; uninjured, *Singleton*, and *Southampton*.

THUJA pendula; not injured, *Chiswick*; remarkable-looking specimen, ten feet in height, *Bicton*.

THUJA orientalis; a few branches killed, *Bagshot*; young plants much cut, *Exeter*; uninjured, *Chiswick*.

THUJA orientalis stricta; a fine-looking plant, between ten and fifteen feet in height, *Bicton*.

THUJA variegata; not affected during the winter, *Bagshot*; untouched, *Singleton*.

THUJA Nepalensis; unhurt, *Alton*.

THUJA flagelliformis; escaped unhurt, *Shiffnal*; untouched, *Singleton*.

TORREYA nucifera; safe, *Alton*.

TROLLIUS Chinensis; not affected during the winter, *Bagshot*.

ULEX europæus; unhurt, *Rolleston*; killed to the ground in many places, *Shiffnal*; many killed, *Nottingham*; killed, *Oulton*.

ULEX europæus fl. pl.; killed, *Rolleston*; killed to the ground everywhere, *Shiffnal*; killed, *Ossington*; many killed, *Nottingham*.

ULEX strictus, or *hibernicus*; not injured, *Chiswick*; killed to the ground everywhere, *Shiffnal*.

VACCINIUM myrsinites; injured, *Bromley*.

VERONICA salicifolia; killed, *Kew*, and *Chiswick*.

VERONICA Lindleyana; killed, *Bromley*, and *Chiswick*.

VERONICA speciosa; quite hardy, *South Devon*; killed, *Chiswick*; killed, *Bicton*.

VERONICAS, shrubby; on a south wall suffered much above their temporary winter coverings of grass mats, *Edinburgh*.

VIBURNUM Tinus; none of the varieties are injured, *Chiswick*; leaves very much blotched and injured, *Ware*; somewhat damaged, *Alton*; killed to the ground generally; one or two plants injured but not killed, and are throwing out fresh leaves and shoots, *Ossington*; killed down, *Oulton*; young plants much cut, *Exeter*; top killed, *Rolleston*; killed to the ground everywhere, *Shiffnal*; almost all killed, the bark of the thick wood having been burst by the frost, *Nottingham*; very much cut in the open ground, *Liverpool*; uninjured, *Southampton*.

VIBURNUM grandiflorum; killed to the ground, but starting again, *Chiswick*.

VIBURNUM dilatatum; killed, *Chiswick*.

VIBURNUM cassinoides; young wood much injured, *Chiswick*.

VIBURNUM cotinifolium ; not injured, south wall, *Chiswick*.

VIBURNUM odoratum ; cut down, *Bicton*.

VIBURNUM plicatum ; not affected during the winter, *Bagshot*.

VIBURNUM macrocephalum ; not affected during the winter, *Bagshot*.

VIBURNUM suspensum ; slightly injured, *South Deron*.

VIBURNUM rugosum ; the ends of the branches killed on a wall facing the south, *Liverpool*.

VITEX Agnus Castus ; killed to the ground, *Chiswick*.

WEIGELA rosea ; not injured anywhere.

WITHERINGIA superba ; killed to the ground, *South Deron* ; killed, *Chiswick*.

YUCCA filamentosa ; injured, *Rolleston*.

YUCCA gloriosa ; injured, *Rolleston* ; very much injured, all the branches killed, together with a portion of the stem, *Nottingham* ; suffered much, *Warrington*.

YUCCAS ; not injured, with the exception of a species from California, which had its leaves slightly browned, *Chiswick*.

ZIZYPHUS vulgaris ; killed, *Bicton*.

XVII.—REPORT ON A TRIAL OF THE DUTCH METHOD OF FORCING APRICOTS. By Mr. W. Tatter, Gardener in the Royal Gardens of Herenhausen, near Hanover.

(Translated from the Allgemeine Garten Zeitung, of Berlin.)

DURING my stay in Holland in the years 1847-8, I had opportunities of becoming well acquainted with the gardens there, as I had recommendations to the principal nursery gardeners at Haarlem, and through them was readily introduced into the best forcing establishments of the neighbourhood.

The arrangements for the forcing of Apricots, Peaches, and Figs, specially attracted my attention, because the method of forcing practised had been till then unknown to me. When in the spring I was a witness of the results, and could admire the abundance and perfection of the fruits produced, I immediately conceived the project of attempting a similar process in Hanover. On my return here, as soon as my official position enabled me to

do so, I wrote to Haarlem for an Apricot-tree, as I could find none here suitable for the purpose. The results were so satisfactory, that even the English methods of forcing, with which I subsequently became acquainted, do not appear to me such as to supersede the Dutch.

It had been considered as very doubtful, by the most experienced gardeners, whether the climate of Northern Germany would admit of forcing establishments similar to those of Holland. The results will show how far I have succeeded in solving this problem.

I hope by the publication of these experiments to render a service to German gardeners, in recording the details of the process. I believe, indeed, that it may be known to some; for I see it is adverted to in the excellent work entitled, "Practical Introduction to the Forcing of Fruits," by C. F. Fintelmann, p. 126; but I do not recollect to have seen it actually practised in any German garden.

For the first experiment, a wooden pit (represented in the accompanying plate) was built, and in the beginning of March an Apricot-tree was planted in the box (a) prepared for it. The soil made use of consisted of a mixture in equal parts of rotten wood and garden loam; and I have found that this mixture is peculiarly suitable for the Apricot, especially during the period of forcing. The tree taken for forcing had been, from the earliest age, transplanted every two years, and had thus formed copious fibrous roots; in a word, it is essential that such a tree should have its mass of roots in the best possible condition, in order that it may bear transplanting without injury.

The great object was, now, to produce good fruiting wood: for this purpose, at the end of May, all superfluous or badly placed shoots were stopped before they had completed their growth, and removed in this state, an operation which enabled the obtaining an equal distribution of wood. The tree now threw its whole strength into the remaining branches. The strong shoots, and in general all those which appeared unfit for bearing, were then shortened to a third of their length. The result was the production of a great number of strong, healthy, fruiting spurs, which had shot out with great vigour from the eyes of the shortened branches. Again, many of these spurs were yet sacrificed to the pruning-knife; for the tree would have been unable to bring to perfect maturity so great a mass of bearing wood, notwithstanding several waterings of liquid manure with which it was strengthened.

This treatment appeared to agree well with the tree, as it remained perfectly free from insects.

The young shoots remained unfastened, because, when they are not disturbed nor bent, they grow more vigorously, and attain greater perfection. However slight the bending of a branch may be, it is still in so far injurious to its growth, for the sap, as is well known, always endeavours to rise. By the curvature of a branch, a hindrance is opposed to the circulation of its sap, its maturity is hastened before it has attained so great a degree of perfection as if it had never been bent.

In the beginning of November the tree had already lost its leaves, a sure sign of the maturity of the wood, and I must confess that the excellent bearing wood it had formed was such as is seldom seen. The tree was now perfectly ready for forcing, and this is the most important part of the operation, as upon it depends directly the future results.

The severe cold which came on in December rendered it necessary to put the lights on the pit to keep the branches from freezing. The roots had already been covered with leaves in November.

On the 5th of January the pit was prepared for forcing. Before putting in the hot dung I inserted a wooden partition (*g*), about nine inches below the espalier (*f*) for the purpose of packing the dung underneath it, and for the reception of a lining of oiled paper on each side which should protect the tree from the strong effluvia of the dung. This partition is not in the Dutch pits, yet I would strongly recommend it as most useful. The Dutch only plant their tree at the time of commencing the forcing. The tree in question had been planted in the spring, and we had so far departed from the Dutch plan in the expectation of more certain success.

The roots of the tree were slightly disturbed in order that the later formed wood-buds might not follow too closely on the flower-buds, it being necessary that these should expand before the others have grown vigorous; the tree was thus slightly weakened at the commencement of the forcing.

Nothing more was now cut from the tree, as the summer training had rendered this unnecessary, only what little dead wood there may have been was removed. The stem and branches were washed with clean water, in order to destroy any insects there may have been. The main branches only and such shoots as would otherwise have touched the glass were fastened down.

After the pit had been filled from behind, through an opening left for the purpose, with fresh horse-dung up to the wooden partition, the whole was surrounded to the thickness of three feet with a bed of leaves and dung.

The forcing commenced on the 6th of January, with a maximum temperature by day of $+ 5^{\circ}$ Reaum. (43° Fahr.), the minimum being $+ 1^{\circ}$ Reaum. (35° Fahr.) By night the maximum was $+ 4^{\circ}$ Reaum. (41° Fahr.), the minimum $+ 1^{\circ}$ Reaum. (35° Fahr.). In the sunshine, however, the temperature rose to 3° (7° Fahr.) more.

The box (*c* 1) which encloses that in which the roots were planted was completely filled with dung and leaves, in order to maintain a moderate degree of warmth around the roots and induce them to produce fibres. Much depends on the tree having produced abundance of these fibres before the buds are developed, as the latter draw the greater part of their nourishment from them. Throughout the autumn the roots had been kept very dry, on which account a watering with warm water at the temperature of 28° (95°) had become necessary.

With Apricots it is particularly necessary to keep the temperature as equable as possible, although in the night-time it may be lowered. The diminution of temperature in the night-time is indeed essential, as experience has shown it to be both beneficial and useful. The tree would in the night without light under a high temperature be drawn up, would send out long weak shoots, and consequently bear small and bad fruits. On dark days a diminution of temperature is for the same reason necessary.

After a lapse of eight days the temperature was raised. In order to give a general view of the raising and diminution of the temperature, I subjoin to this report the table of temperature by which the tree was cultivated. This table was put up in the pit, and everything connected with the operation was regularly entered.

Air is very beneficial to the Apricot-tree, consequently as much as possible was given to it. During the night the ventilators of the pit were kept open in order to reduce the temperature, and also to remove any vapour from the dung which might have penetrated. But in order to stop too great an influx of air, the ventilating openings were covered with mats.

The pit was covered during the night more or less, according to circumstances, in order to keep up a regularity of growth, rather

below than above. The beds of dung round the pit were several times raised or changed; this operation was regulated by the external and internal temperature.

Under this treatment the buds developed with great vigour. An examination of the roots showed that they had formed a great number of new fibres. The tree perfected its flowers about the 8th of February. The pit was now no longer covered at night, the temperature lowered, all moisture kept carefully away, and as much air given as the outer temperature admitted of. When the sun shone it was slightly shaded from 11 to 2 o'clock; but sunshine occurred so rarely that the pit had only once to be actually shaded. On the other hand, the rain often obliged me to cover the pit with a second set of lights, in order to keep out the damp.

After the lapse of a week it was observed that several flowers, in the centre of the tree, had set; this was taken as an indication for raising the temperature, in order to induce a more rapid growth of the fruit. It is very important to observe accurately the setting of the fruits, for if they do not then receive sufficient warmth, and they only remain stationary a few days, their early fall may very easily follow. They must rapidly throw off the remains of their flowers, which is effected by a rapid growth, for, if these remain long about the young fruit, the latter will, indubitably, rot. In the open air we may often observe this fact, on the Cherry, for instance, which will blow splendidly, but from this same cause, not bear fruit; the warmth necessary for their proper setting is wanting. In forcing, the gardener has in his own power the means of regulating the heat necessary for the flower.

The pit was now shaded from the bright mid-day's sun. A gentle sprinkling on sunny days proved of great use, and as it was given very early in the day, the sun removed all damp before night. This watering was, however, not given till after the remains of the flowers had all fallen. The vegetation in the pit was vigorous, the leaves opened out satisfactorily, and the young fruits grew on happily. The few insects which appeared were carefully removed; some caterpillars of the *Tortrix Bergmanniana*, which had rolled themselves up in the young leaves, were destroyed. A few aphides were found at the extremities of the young shoots, about the time when the stones were forming. On that evening, and the following morning, they were strongly fumigated with tobacco, which still remains one of the surest

means of destroying these insects. The red spider did not show itself at all.

Towards the 8th of March the stoppage of growth in the shoots, as well as the fruit, indicated the period of forming the stones; the temperature was lowered, in order to give the stone the necessary rest to come to perfection. Too much forcing at this period is very prejudicial. With too much heat the fruit does not know whether to form stone or flesh, it is placed in a position which compels it to produce both at once, the consequence of which is a small dry fruit.

During this period of rest in the growth of the fruit, the superfluous wood was removed, and the longest shoots stopped, but with much caution, in order not to disturb the forcing of the tree. Whilst the stones are forming the fruits require much nourishment, which must be copiously supplied to them. Shade and air must not be neglected, and the latter must more especially be attended to; and if it be given early in the morning, not many insects will show themselves. On the 1st of April another watering was given, an examination of the soil having proved it to be indispensable. After the formation of the stones a watering is very necessary, before that period it is injurious, as causing readily the fall of the fruit. No fruits were thinned out, the object of the experiment being to ascertain what quantity the tree, under this treatment, could be made to bring to perfection.

At the end of the fourth week, the stones being fully formed, the temperature was again raised and maintained till the maturity of the fruit. On sunny days, after the pit had been sprinkled with water (at about half after 3 p.m.), the lights were closed, thus producing a warm damp close atmosphere, which contributed much to the ample swelling of the fruits.

At the period of colouring of the fruit the pit was kept dry, so also no moisture was admitted during the ripening; neither was it any longer shaded, but as much air was given as the outer temperature allowed of, this contributing essentially to the flavour of the fruit as well as to a natural and good colouring. The luxuriance and healthiness of the foliage gave good promise of highly flavoured fruit. Its maintenance is important, as without good foliage there never can be well-flavoured fruit.

As soon as the fruit was all gathered, the lights were, on a dull day, all taken from the pit, and the tree completely exposed to the action of the open air. Next winter I purpose again to force it, commencing from the 1st of December. The wood is

sound and vigorous, and my exertions are now directed to its early ripening.

The result of the above experiment was the bringing to perfection 290 well-grown and highly flavoured fruits, of which the first ripened on the 27th of May. The variety forced was the small Orange-Apricot.

Considering the great difficulties usually experienced in the forcing of Apricots, and the extraordinary results obtained, as well as the natural simplicity and cheapness of the present method, I leave it to all those who are conversant with forcing-houses to judge of its merits, and I specially recommend it to those who know what is the cost of an ordinary forcing-house, and of the cultivation required in it.

The Director of the Royal Gardens has given orders for the carrying out this mode of forcing in future on a large scale, and measures for that purpose are already in progress.

In conclusion we may observe that we procured the tree in question from the brothers Veen and Co., in Haarlem, for the price of 15 Dutch florins, and we can strongly recommend this house to those who may wish to obtain similar trees.

The following table is an essential one to be kept by forcing gardeners during the time of forcing, especially where for example several sorts of Apricots are forced together. The observation of the progressive development of different varieties is of great interest, and from their comparison useful results may be deduced. The gardener, moreover, by having these tables to draw up, is induced to follow up the operation more closely, and to penetrate deeper into the principles of forcing.*

The temperatures are those of Fahrenheit's scale.

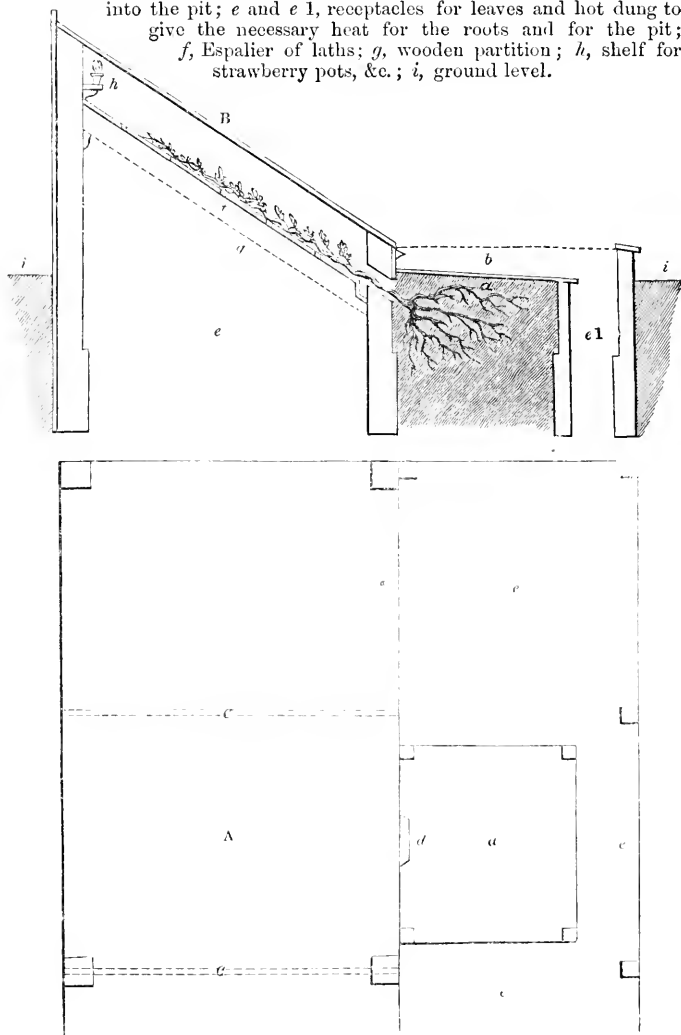
* As this method of forcing, as far as I recollect from having had formerly an opportunity of observing it in Holland, is equally applicable to our northern climate (of Berlin), and is attended with but little expense, I have no hesitation in strongly recommending it. The royal gardener of Sans Souci, near Potsdam, Mr. C. J. Fintelmann, has also pronounced in its favour. (Note by the Editor of the *Allgemeine Garten Zeitung*.)

TABLE OF THE TEMPERATURE AND COURSE OF VEGETATION DURING THE FORCING OF A SMALL ORANGE-APRICOT TREE.

Date (1854).	Temperature. by day. by night.				State of the Tree.	Remarks.
	Max.	Min.	Max.	Min.		
Jan. 6—14 .	43°	34°	41°	34°	Total rest in the buds.	January 7.—Tree watered with eight pots of water at 28° Reaumur.
Jan. 14—21	50	41	43	36	The buds began to stir perceptibly about the 16th, especially in the upper shoots.	In order that the pit might not cool down too much, the 16th January the external dung-bed was raised; the tree was also mulched.
Jan. 21—28	59	50	50	41	The swelling of the buds progresses; it is more marked in the upper half of the tree, which is three or four days in advance of the lower half.	To restore regularity in the shoot, the lower part of the pit only was covered.
Jan. 28 to } Feb. 8 . . }	63	59	54	45	As the budding advances the inequality disappears, the swelling proceeds regularly, and flowers expand on the 4th.	Jan. 23.—Air given to the foot of the tree in order to draw off the superfluous heat.
Feb. 8—15 .	54	50	50	45	In flower from the 8th to the 15th. The wood-buds open out, those at the end bursting most vigorously.	Jan. 26.—The external dung-bed was raised.
Feb. 15 to } March 8 . . }	68	63	54	50	First fruit set on the 12th.	Jan. 28.—New fibres had formed on the roots.
					Impregnation and setting proceed satisfactorily. Wood-buds shoot out. Leaves slowly unfold, more rapidly on the upper than the lower shoots.	When it snowed or rained during flowering, the pit was covered.
					Petals fall about the 18th February, and young fruits swell. They throw off the calyxes about the 2nd March.	Feb. 24.—Heat of the external bed increased to push forward the flowers.
March 8—31	59	54	54	50	Fruits the size of a hazelnut. The stoppage in their growth, and in the shoots, indicates the period of stoning. The leaves large and strong, and shade the fruit; towards the 27th the stones begin to harden.	Feb. 27.—Lower external bed renewed to restore regularity in shooting.
April 1 to } June 26 . . }	68	63	59	54	The increase of the fruit and the development of second shoots prove that stones are formed. The fruits now grow rapidly, and towards the 29th April the greenish colour changes to a yellowish white.	Insects immediately destroyed. 8th and 9th March fumigated with tobacco.
					The first fruits ripen on the 27th May.	March 20.—The superfluous wood is removed and the longest shoots shortened.
						March 30.—Heat of external bed increased, in order to raise the temperature.
						April 1.—Tree again watered.
						Besides such fruits as fell off none were removed.
						In the course of the summer, 290 well-grown fruits were brought to maturity.

EXPLANATION OF THE PLATE OF THE DUTCH WOODEN APRICOT PIT.

A, plan ; B, section ; *a*, box of earth for planting the tree in ; *b*, covering to keep the water from the lights from penetrating to the roots ; *c*, moveable sashes ; *d*, moveable board to be taken out to let the stem into the pit ; *e* and *e* 1, receptacles for leaves and hot dung to give the necessary heat for the roots and for the pit ; *f*, Espalier of laths ; *g*, wooden partition ; *h*, shelf for strawberry pots, &c. ; *i*, ground level.



XVIII.—ANALYSIS OF A CHINESE WORK ON HUSBANDRY AND BOTANY. By Sir John Francis Davis, Bart., K.C.B., F.R.S., Fellow of the Horticultural Society.

(Presented to the Society with the original work.)

DURING the four years passed by me in China, as Governor of Hongkong, I had frequent communications with an accomplished Italian, Monsignor Il Conte di Besi, Bishop *in partibus infidelium*. His long residence in the country (I had known him there in 1834) and his knowledge of the language, joined to the new facilities and immunities afforded by our Treaties, had enabled him to procure valuable Chinese books, among which was a work which he was good enough to present to myself. It relates to the whole system of national husbandry, and treats at the same time largely of botany, being entitled *Noong-Ching Tseven-shoo*, literally "*De Re Rusticâ liber completissimus*." In a Chinese sense the title is certainly not misapplied.

Subsequent leisure has enabled me to examine it with some attention; and as the methodical arrangement of the work, together with the incidental notices, appeared to be sufficiently illustrative of the state of Chinese knowledge on an important subject, it occurred to me that a short analytical summary of the whole might be considered within the scope of the objects pursued by the Horticultural Society.

The work is divided into sixty sections, and contained in twenty-four of those *brochures* which constitute the form of all Chinese books. A covering of handsome green silk distinguishes this book from ordinary ones, and the printing and paper are of the best description. Some hundreds of coloured woodcuts illustrate the various objects described in the work.

Sect. I.—III. The three first sections treat of the origin and early history of husbandry, commencing with what is to be found in the classical writers, and then proceeding to cite generally what has been said later on the subject. "Men," it is observed, "lived entirely on flesh until the time of Shin-Noong, 'the divine husbandman,' who taught them to *study the seasons* and *cultivate the earth*." This plainly refers to the pastoral state as preceding the agricultural, and the first lessons of the Chinese, as of all other early nations, consisted of what Virgil calls

"Arvorum cultus, et sidera cœli."

The third section records all that the different dynasties of sovereigns have instituted as regulations and customs to give importance and encouragement to husbandry. In my work on China I had occasion to state that agriculture has always been called the "root," and manufactures and trade only the "branches."

Sect. IV., V. These two sections are on the construction and regulation of fields and cultivated lands. They are ranked in the three-fold order of—1, Rice-fields, or those artificially levelled or flooded, and called *Tien*; 2, those destined to the ordinary, natural, or dry cultivation, called *Te*; 3, the hills, or more barren and waste lands, called *Shan*. These three constituted the divisions of Chusan during our occupation,* and they pay dues to government accordingly, in a descending scale. The terrace cultivation in steps is called *Te-tien*, or "Ladder-fields."

So generally have the Chinese adhered to the decimal scale, on account of its obvious advantages, that their land measurements are squares of ten. Thus a hundred square Poo make a Mow, or what has been called a Chinese acre; a hundred Mow make a Foo. The original or theoretical divisions of land were in the style of a chess-board, which of course usually becomes impossible in practice.

Sect. VI.—XI. The six next sections are entitled the "Business of Husbandry." The sixth and seventh relate to the management of farms, ploughing, and the use of manures. It is inculcated as a maxim in farming, "Better a little land and good than much and bad." The eighth and ninth sections are on the breaking up and reclaiming of waste lands. The government as an encouragement to the cultivation of wastes, and the production of food for the people, allows any unreclaimed lands to become the property of him who first brings them into tilth, and levies no taxes until such time as the produce yields a surplus. The tenth and eleventh sections treat of the four seasons and their respective productions. The twelve lunations of the Chinese year are reviewed in detail. The various natural phenomena of each period, with the plants and animals which distinguish each, are enumerated, and there is a complete collection of prognostics.† In the tenth section is given a curious diagram, consisting of concentric circles, after the fashion of those which surround the Chinese compass. Near the centre are the seasons, months, &c.,

* "Chusan, with a Survey Map of the Island."—*Journal of the Royal Geographical Society*, vol. xxiii., art. 20.

† The subjects are exactly those of the *Phenomena* and *Dioscoria* of the Greek poet Aratus.

and, radiating from each of these, are the natural phenomena of each period. In the outer or largest circle of all are the labours to be performed, and the products to be expected, under every season. It is in fact a very comprehensive synopsis of "Works and Days."

Sect. XII.—XX. Considering the important part which water performs in Chinese husbandry, it is not surprising to find nine sections devoted to the "Profit (or use) of Water." After some "*Tsoong Lun*," or "General observations," the work proceeds to notice the modes of irrigation in various parts of the empire; but as the eastern and southern provinces are incontestably superior in their natural advantages to the western and northern (which are either mountainous or cold), so three sections are given to the east and south, and only one to the west and north.

The seventeenth section treats of the construction and management of dams and sluices, and the various modes of raising water to a higher level. Coloured woodcuts give very clear representations of the wooden chain-pump, the (so-called) Persian wheel observed by our embassies in the interior, and other contrivances for irrigating lands lying *above* the level of the water required. This is very essential in Rice cultivation, and the Chinese effect their object, as usual, with great ingenuity and success.

The eighteenth section treats of Chinese water-wheels of various descriptions, which are illustrated by coloured wood-cuts; and the nineteenth and twentieth sections give some account of the water machinery of the "great west," meaning some of the practical applications of hydrostatics and hydraulics in Europe. This must have been collated from treatises in Chinese composed by the Jesuit missionaries. Coloured diagrams are interspersed, explaining the principles of lifting and forcing pumps (the latter with double alternating pistons and no air-chamber), and other European contrivances. They commonly apply the principle of the forcing-pump in their fire-engines, which are very efficiently constructed. The Chinese are shrewd enough to perceive and adopt what is really advantageous in use, though it may be foreign, and this part of the work contains the very undeniable remark that "without the machinery for water, you cannot have the profits of water."

Sect. XXI.—XXIV. These four sections are devoted to the description and representation of "*Noong Kee*," "The Tools or Implements of husbandry." Here the coloured woodcuts come in with good effect, and are highly illustrative of about one hundred and twenty different implements, the use of most of which is

sufficiently obvious, without the printed description. They comprise varieties of ploughs, harrows (square and diagonal), scarifiers, bush-hurdles (some loaded with stones), rollers of different kinds for smoothing or dibbling the ground, hoes, spades, shovels, rakes, breast-ploughs, sickles, bill-hooks, choppers, slicers, bamboo stages for drying corn, instruments for separating the corn from the husk,* mills moved by two mules, baskets, tubs, and vessels of many sorts, and winnowing machines. Of the last I have already remarked in my work on China, "They have a winnowing machine exactly like ours, and there seems to be the best evidence for the fact that we borrowed this useful invention from them. A model was carried from China to Holland, and from Holland the first specimen reached Leith."

Sect. XXV.—XXX. Six sections are devoted to all those vegetable productions which are the subject of planting or cultivation. It may be remarked, incidentally, that the importance of eight of these is indicated by their names constituting eight out of the two hundred and fourteen *roots*† of which the whole written language of China is compounded, viz., Rice, Bamboo, Wheat, Millet, Bean, Onion, Hemp, and Cucurbitaceous plants. They were, in fact, the original materials of food, lodging, and clothing, as derived from the earth.

The two first of the above six sections treat of the principal sorts of Grain and Pulse constituting the materials of food. The third comprises the different species of Cucurbitaceous plants, of which the Chinese possess a great variety and make much use. The fourth is on various culinary vegetables, chiefly of the Onion and Leek tribes. The two last enumerate and describe the principal fruits of China, as the Leechee, the Longan, the Myrica described by Mr. Fortune at Chusan, the Grape (little cultivated in comparison with Europe), the great variety of Oranges, Citrons, &c. &c. I had occasion in another place to notice that the Chinese do not cultivate their fruits with quite the care and skill that they bestow on their flowers; and the practice of planting their fruit-trees on the banks of streams and canals, though it has been found favourable to the trees, renders the fruit the object of depredation, and causes its being gathered immature.

Sect. XXXI.—XXXIV. These four sections are devoted to *Tsân Sâng*—"Silkworms and Mulberry-trees"—that is, the

* There is no representation of a flail.

† These were all classified in a paper printed by the Philological Society.
—*Proceedings*, vol. i., p. 59.

rearing of the silkworm, and the cultivation of the Mulberry for that purpose. The thirty-first section commences with "general observations," and proceeds to the subject of feeding the silkworms. The thirty-second relates entirely to the planting and cultivation of the Mulberry-tree. The two next sections are copiously illustrated with woodcuts, in explanation of the management of the silkworm by women, from the egg to the spinning of the cocoon by the worm, and then onward to reeling off the silk, and every other successive step to the final process of weaving.

Sect. XXXV.—XXXVI. After silk come the two cognate subjects of Cotton and Hemp, the first of which is treated in the thirty-fifth, and the second in the thirty-sixth section. Numerous woodcuts represent the various processes of reeling and weaving these two substances.

Sect. XXXVII.—XL. These four sections are devoted to the subject of *Choony Chě*—"sowing and planting." First come general observations, which occupy the thirty-seventh section. A great number of useful trees, among others the Varnish or Lacker-tree, are discussed in the thirty-eighth chapter; while the Bamboo and the Tea-plant occupy, par excellence, nearly the whole of the thirty-ninth. The fortieth section is devoted to the consideration of nineteen different varieties of useful trees and plants.

Sect. XLI. This section treats of domestic animals, either edible themselves, or useful in providing or preserving food. They are in the following order:—horses, mules, oxen, sheep and goats, pigs, dogs, cats, geese, ducks, fowls, pond-fish, and lastly bees. The Chinese, like Virgil, call the queen bee the king.

Sect. XLII. The whole of the forty-second section is composed of a large collection of useful receipts, principally for the preparation of articles of food.

Sect. XLIII.—XLV. The remaining portion of this work is the most remarkable of all. I have endeavoured in my work on China * to explain the causes which (grounded on the encouragements to over-population) tend to make the country liable to frequent visitations of dearth and famine. For these reasons, there is no nation perhaps in which so much attention has been directed to extraordinary provisions against famine. To this may probably be attributed the unlimited range of the Chinese kitchen and bill of fare, as well in the vegetable world as the animal. I

* Vol. II. page 401—414.

may quote an example from the description of a dinner at Chusan. "Another strange ragout proved to be the flowers of the common China (or monthly) Rose dressed whole. Here the mixture of salt, sour, and other indescribable flavours forbade a repetition." There are few instances in which *we* dress the flowers of plants. For one, at least, there is the authority of the inveterate Londoner, who said, "There was no garden like Covent Garden, and no flower like a Cauliflower." Artichokes are an example of eating a portion of the immature flower.

The three sections, from forty-three to forty-five, are devoted to the history of public provisions against dearth. In the last is an enumeration of 414 plants described and figured in the concluding volumes of this work, of which 138 are taken from the standard Chinese herbal, called *Pun-tsaou*, and 276 have been added. They are classified as follows:—

<i>Tsaou</i> —Herbaceous *	245
<i>Müh</i> —Woody	80
<i>Me Kùh</i> —Grains and Pulse	20
<i>Kwo</i> —Fruits	23
<i>Tsac</i> —Culinary Herbs	46

414

A further classification of the same is given, as under:—

Leaves edible	237
Seeds „	61
Leaves and seeds edible	43
Roots edible	28
Roots and leaves edible	17
Roots and seeds „	5
Offshoots from roots edible	2
Roots and flowers „	2
Flowers edible	5
Flowers and leaves edible	5
Flowers, leaves, and seeds edible	2
Leaves, bark, and seeds „	2
Stalks edible	3
Young shoots edible	1
Shoots and seeds edible	1

414

Sect. XLVI.—LIX. These fourteen sections are styled the "Provisional Herbal against dearth," being the history of all the

* This term is extended sometimes to soft-wooded or pithy plants, as the Fig.

plants above classified, and the modes of preparing them as food. The description and coloured representation of each plant occupy two contiguous pages, and are easily found. The contents of the sections are as follows :—

Section		
46—50	Herbaceous plants, leaves edible	159
51	„ „ roots „	24
52	„ „ seeds * „ :	20
„	„ „ leaves and seeds edible	12
„	„ „ roots and leaves „	23
„	„ „ stalks „	3
„	„ „ shoots and seeds „	1
54	Woody plants, leaves edible	41
55	„ „ seeds (or fruit) edible	20
56	„ „ leaves and seeds „	8
„	„ „ flowers „	5
„	„ „ flowers and leaves edible	1
„	„ „ flowers, leaves, and seeds edible	2
„	„ „ leaves, bark, and seeds „	2
„	„ „ offshoots from roots „	1
57	Grain and Pulse, seeds edible	20
58	Fruiting plants, fruit „	14
„	„ „ leaves and fruit edible	5
„	„ „ roots „	2
„	„ „ roots and fruit „	2
„	Culinary plants, leaves edible	14
59	„ „ „ „	19
„	„ „ roots „	2
„	„ „ roots and leaves edible	4
„	„ „ leaves and seeds „	5
„	„ „ roots and seeds „	1

410

The above list is, for some reason or other, short of the preceding summary by *four*.

Sect. LX. This concludes the work with drawings and descriptions of sixty-three wild plants, edible in case of famine.

As to the style of description, the following account of the native Chinese Fig (Sect. LV.) is a specimen of the way in which each pictured plant is described. From my own experience, the native Fig of China is very poor, and hardly advanced beyond the wild state. It would be a real benefit to send some of our European Figs to Hong Kong.

“The flowerless fruit grows in the hills and wilds. At present it is also planted in gardens. The leaves somewhat like those of the Vine, but larger, stiffer, and thicker; divided into three lobes.

* The term *shě* is occasionally applied to either seed or fruit. It means the *essential product* of the plant.

The fruit grows at the junction of the leaf with the stalk. It is at first green and small; when ripe, of the shape of a pear, and of a purple colour; taste sweet. The fruit may be gathered and eaten."

The drawings, in this work, of some four hundred and sixty plants, however inferior to our own in execution, might very well serve, in combination with the appended names and descriptions, to procure specimens of the plants, of which many must be new. The localities are often, and indeed generally mentioned. Portions of the work might be advantageously translated in detail; but two circumstances are essential. The translator must have leisure for the task; and he must be resident in China, as many points would require elucidation on the spot.

XIX.—ON THE VINE MILDEW. BY HUGO VON MOHL.

Translated by the Rev. M. J. Berkeley.*

(Third Memoir.)

IN a former memoir (*Bot. Zeit.*, 1852, No. 33) I have described the phenomena which are presented by the Vine-mildew during the first weeks of its appearance in June, and have deduced from their successive development the inference, that the disease is purely a consequence of the baneful influence of the parasite upon the Vine. I take occasion now, in order to complete the picture presented by the diseased Vine, to represent the condition of the plant, in the second half of the summer up to the close of the period of vegetation; and this, as it appears to me, will afford further proof against the notion that the disease is independent of the fungus. My residence in the Southern Tyrol afforded me unhappily the most perfect opportunity for such investigations, since the disease not only was so widely diffused that it was impossible in the neighbourhood of Bozen, during the latter part of summer, to find a single leaf or bunch which was not, when examined by a lens, overrun by the threads of the fungus, but at the same time was so severe that the entire vintage was destroyed.

I have remarked in my second memoir that the vegetation of the Vine, both before and after the appearance of the disease, has

* From *Botanische Zeitung*, March 3, 1854.

not exhibited the least interruption. The same may be said of its vegetation in summer and autumn, inasmuch as the only visible deviation from the normal condition consisted in the circumstance that the leaves were rather less smooth and even than healthy Vine leaves are wont to be and approached the condition of what Botanists call "*folium bulbosum*." In every other respect the growth of the stem and leaves was completely normal, and when the leaves fell in autumn, there was nothing unusual in the appearance of the Vines; the condition of the fruit was in consequence so much the more surprising. Above all it was at once apparent that its growth was very much impaired. In the middle of August the greater part of the berries at Bozen had acquired only the size of peas, and many were still smaller: a few only had attained their normal dimensions, and this mostly in the case of single berries, and only with extreme rarity throughout a whole bunch.* The cuticle of the berries, which had been arrested in their development, was thickly studded with little brown warts, arising from the points of attachment of the threads of the fungus previously described; in other respects they were perfectly green. In a few more malignant cases the brown specks had coalesced into larger spots, which extended over a greater or less part of the berry, consisting of the dead outer layers of cells and presenting a tough membrane.

The more the cuticle was degenerated, and the further the degeneration extended over the berries, so much the more was their growth impeded. If it was defaced only in a single confined spot, the unaffected part swelled while the growth of the diseased portion was impeded, and consequently the berries assumed an irregular form. In general the whole cuticle was diseased and presented such a resistance to the growth of the parenchym, that it was checked in its development. The firmness of the cuticle was, however, frequently insufficient to withstand the pressure of the parenchym as it strove to become expanded; in these cases a fissure in the cuticle was formed, small at first, but widening with the expansion of the flesh into a deep gaping crack. This appearance was the more common when strong rain fell after preceding dry weather, as was the case at the commencement of September, when not only the unripe berries, but those which

* A notion of the extent of the evil may be conceived from the fact that in Meran, where the Vine-mildew was less destructive than at Bozen, it was only with difficulty that the few hundredweights of grapes, which were wanted by the invalids, could be collected.

had advanced far towards maturity, cracked in multitudes. The diminished growth of the flesh had no influence on that of the seeds, for they were found in berries which had acquired only half their normal size, as completely formed as in well-grown fruit.

The effect of the diseased cuticle on the berry is not, however, confined merely to this mechanical disturbance, by means of which the parenchym is retarded in its growth, but the maturation of the fruit is in a high degree impeded by the diminished development of the parenchym, although not entirely prevented. Such berries as are greatly hindered in their growth, and attain only the size of coarse shot, simply dry up; while those on the contrary, as is more generally the case, which attain about the half of their normal diameter, become at length, though late, rather soft but very imperfectly ripe, with a faint reddish tint, and sweetish taste, yet in so low a degree, that a useful wine cannot be prepared from them.

The splitting of the berries, likewise, does not absolutely prevent maturation, only the fissured grapes are equally unfit for wine-making. If the weather is dry for any length of time the portion of the parenchym exposed to the air becomes perfectly dry, whether it be altogether unripe, or whether the process of maturation has already commenced: in damp weather the parenchym where it is exposed begins to decay from the attack of several kinds of mould. The *Oidium Tuckeri* is, however, perfectly guiltless as regards this decay, for it never attacks the exposed parenchym, and inasmuch as this corruption does not depend upon the particular disease, but on the accidental irrigation of the parenchym with rain-water, the name of Grape-rot (*Traubenfäule*) so often given to the Vine-mildew is not correct.

The phases of the Vine-mildew may be stated as follows:—

1. The Vine shoots vigorously in spring, and in no one respect betrays any appearance from which disease can be anticipated.
2. The parasitic fungus is produced upon the perfectly sound cuticle.
3. A discoloration of the cuticle and its ultimate destruction take place in those spots to which the parasite is fixed by its suckers.
4. The degeneration of the tissue on the bark of the boughs and on the berries affects only the cuticle and the cells immediately beneath it, while the more deeply seated tissue undergoes no visible alteration, and in the leaves even the destruction of the cuticle does not take place.

5. The disease of the cells does not induce putrescence, but desiccation and the change of the affected walls into a tough skin which in a very remarkable degree presents a mechanical obstruction to expansion.

6. In consequence of the binding of the cuticle, the parenchym of the berries is impeded in its normal growth.

7. The berries therefore acquire only half their size, and the change which takes place on the maturation of the fruit is very incomplete.

8. Every individual berry of a bunch, in which the rest are diseased in a high degree, whose cuticle has not suffered under the attack of the fungus, progresses to its normal size, while the non-maturation of the other berries cannot be ascribed to any disease of the plant.

Whereas on the one side there is not a single sign which indicates a general or local disease of the Vine, and, on the other, observation proves that the parasitic fungus produces a malady on the spots to which it is attached, and since all the phases of the malady are deducible from this affection of the superficial tissue, it follows, as a matter of necessity, that the cause of the Vine-mildew must be assigned solely and entirely to the Grape-fungus.

If we call in aid a present predominant predisposition of the Vine to the malady to explain the general diffusion of the fungus, which had never been observed before, a point arises which does not admit of dispute, since any sure foundation for the discussion is wanting, inasmuch as this supposed predisposition is not evinced by any especial symptom, but is deducible only from the accidents of the disease, and its diffusion admits of explanation as easily from the assumption that, admitting the perfectly unaltered constitution of the Vine, the progress of the Vine-mildew in the present moment is favoured by causes which are unknown. According to this supposition, which as it appears to me is most accordant with existing phenomena, we shall have as little reason to take into consideration the whole question of the condition of the health of the Vine, as, for example, the pathological condition of our Fir-trees, if the production of millions of caterpillars, by which whole forests have been destroyed, be favoured by certain inexplicable circumstances.

In the hope that the study of those species of mould which are analogous to the Grape-mildew might throw much light on the peculiar phenomena of the disease and its attendant fungus.

especially as regards the propagation of the parasite, I turned my attention to the allied fungals, which I found on a multitude of other plants. A special detail of these inquiries is now superfluous, since Monsieur Tulasne has published his own similar observations (*Bot. Zeit.*, 1853, *Compt. Rend.*, Oct. 17, 1853). A short indication nevertheless of the result at which I have arrived will not be entirely undesirable. This consists, in a few words, of the fact that *Oidium Tuckeri* is an Erysiphe, since it not only agrees with Erysiphe in the organisation of the mycelium, but the fructification discovered by Amici on the Grape-mildew is found also on a considerable number of Erysiphes.

A. Bérenger was the first who,* on an investigation of the vegetative organs of the Vine-mildew, pronounced it an Erysiphe (*Il Coltivatore*, 1852, no. 14); but, inasmuch as he did not know the fructification of the fungus, and arrived at the somewhat adventurous conclusion that the *Oidium Tuckeri* is a chinnera and nothing more than Erysiphe communis, his views obtained no followers: notwithstanding, this ill-grounded but lucky conclusion did in point of fact indicate the then systematic position of the fungus in question.

I first discovered in *Sphærotheca Castagnei*, *Lév.*, growing on the leaves of the common Hop, that the fructification found by Amici in *Oidium Tuckeri* could not be considered the characteristic form of fruit of the new genus of fungi proposed by Ehrenberg under the name of *Cicinobolus* (*Bot. Zeit.*, 1853, p. 16), but exhibited a mode of reproduction which existed on one and the same plant at the same time with the oval germinative cells which become disjointed from the upright threads of the mycelium and agree with the well-known secondary fruit of Erysiphe. This species exhibited a peculiarity, which I also detected in others at a later period; viz., that in one place one form of fructification only occurred, in another place another form more especially; thus at Etschthal I found only the *Cicinoboloid*, at Instertal more especially the Erysiphoid form. Similar relations obtained in *Calocladia Berberidis*, *Lév.*, of which I found at Bozen only the Erysiphoid fruit, while at Meran the *Cicino-*

* The possibility of this is pointed out in the *Gardeners' Chronicle*, July 28, 1849, where it is stated with respect to the Grape and Peach mildew &c. "It is still a botanical doubt whether all these egg-seeded mildews are not simply early stages of the genus Erysiphe, as is certainly the case with that of the Hop." Even in the original article on *Oidium Tuckeri*, Nov. 27, 1847, the relation of such productions is expressly indicated, and other analogous cases brought forward.—*Tr.*

boloid only occurred, though *Erysiphe lamprocarpa* (on *Salvia glutinosa*, *Sonchus oleraceus*, *Plantago major*), *Er. communis* (on *Trifolium pratense*, *Ranunculus acris*) developed both forms close to each other. Under these circumstances it is explicable that I found only the Erysiphoid fruit in *Podosphaeria Kunzei*, *Phyllactinia guttata*, *Uncinula Wallrothii*, *U. Bivonæ*, *Erysiphe Martii*, *E. horridula*, while on the contrary in a series of forms on *Brassica oleracea*, *Heracleum Sphondylium*, *Cucurbita Pepo*, *Pyrus Malus*, *Viola tricolor*, there was a rich growth of Cicinoboloid fruit, but not a single Erysiphoid, on which account I could not determine to what particular genera or species they belonged.

In order to determine the relations of the two forms of fruit to each other, it will be sufficient to examine the fructification of *Sphaerotheca Castagnei*. The upright threads of the fungus which eventually produce conidia capable of germination are generally divided by dissepiments into a greater or less number of cells (8—11) of which the lower are cylindrical, the upper oval.

When one of these threads is changed into a Cicinoboloid fruit (or as it is termed by Tulasne, pycnidium) the change from cylindrical to oval does not take place, but on the contrary one (or sometimes two) of the lower cells swells out and is metamorphosed, in consequence of the formation of a layer of small yellow cells on the inner side of the wall of the cell, into a cellular sac whose cavity is stuffed with minute ovate spores (stylospores of Tulasne), and at its apex the unchanged portion of the thread remains as a long articulated white appendage. The form of this kind of fruit is not determinate, and when the cells enter into its composition the relative size is subject to considerable variation. When mature it bursts irregularly at the apex and protrudes a mass of spores in the form of a tendril mixed with a gummy substance which remains unchanged in alcohol, but dissolves in water and breaks up into the individual spores.

I was not able to detect accurately the formation of the Erysiphoid fruit from a single cell. I feel quite sure about the matter after much investigation, that the notion of Ehrenberg (*Act. He. Nat. Cur.* x. 205) that it springs from the union of many threads of the mycelium is incorrect, but inasmuch as it adheres closely to the horizontal threads from which it springs, or only on a very short ramification, the observation of its first development is surrounded with great difficulties; I believe, however, that I have not deceived myself in thinking that I have seen it proceeding from a single thread, which at an early period

is changed into a cellular knot, whose white hue soon passes into yellow, and at a later period into brown, and that from these superficial cells the thread-like appendages are developed. Though these forms of fruits are so extremely different at first sight, a number of intermediate forms occasionally though rarely are developed. These possess the regular globose form, and in part also the size of the Erysiphoid fruit, and are sometimes though not always furnished with similar articulated hairs, while the articulated filiform appendage is wanting at their apex ; on the other hand they have the same yellow-brown colour, the thin minutely-cellular membrane, and the same small spores mixed with gum as the Cicinoboloid fruit.

Apart from the morphological interest which this form possesses as intermediate between two such different organs, its occurrence is the more important because it contradicts most undeniably the objection which may so easily be made, that the Erysiphoid fruit does not belong to the mycelium from which the Cicinoboloid springs, but is seated parasitically upon it ; an objection which repeatedly deceived me in the beginning of my investigation before I was convinced to the contrary.

In *Erysiphe lamprocarpa* growing on the leaves of *Plantago major*, I constantly found similar intermediate forms, but always having filiform appendages. The Cicinoboloid fruit appeared first on the Vine-mildew towards the end of August, at which time it overran in extraordinary profusion the yet unripe berries, and in some measure the leaves also. It was not developed (as is the case also in all other species of *Erysiphe*) in those parts of the Vine where the fungus exhibited a very vigorous vegetation, and their oval conidia fell off in great abundance, and which were in consequence of a snowy white, inasmuch as the exuberant development of the organs of vegetation proves an impediment to the formation of the organs of fructification. The fruit does not commonly arise as in the Hop-mould from one of the lowest cells of an upright or penultimate thread, but mostly from a terminal cell ; frequently also two or three cells contribute to the formation of a single fruit, or the preceding joint, though retaining its original form, is filled with spores. My microscope was not sufficiently powerful to ascertain perfectly the history of the development of the fruit. At first a yellow finely-granular protoplasm was formed in the cells destined for fruit, in which the granules became gradually more distinct, and the spores capable of being recognised, even before the cells which form the membrane of the sporangium were

visible in the still closed fruit, although they were already present, as was demonstrated by the ruptured sporangium after the escape of the spores. The process of the formation of these spores, and of the cells, did not come under observation. The form and size of the spores is by no means constant; sometimes they are oval, sometimes more cylindrical, sometimes straight, sometimes curved, and their major axis, which on an average equals $\frac{1}{2} \frac{1}{50}$ of a line, sometimes is as little as $\frac{1}{3} \frac{1}{48}$ line, while it occasionally reaches $\frac{1}{1} \frac{1}{6}$ line. A little nucleoid dot as observed by Amici exists at either extremity, the size of which is too minute to admit of any investigation of its nature.

Globose fruit also occurs but rarely, devoid of hairs, and similar to the intermediate form described in the Hop-mould.

Unfortunately I was not able, though with a lens in my hand I searched through many a vineyard, to discover the Erysiphoid fruit; everyone, however, will be convinced from the perfect resemblance which the Vine-mildew exhibits in every other respect to Erysiphe, that under favourable circumstances this form also must be developed. So long as this remains undiscovered, we must postpone the assignment of the plant to a distinct genus, the formation of a diagnostic character, and the establishment of a name.

Are then the bodies in the Cicinoboloid fruit spores capable of germination? To this I can make no distinct answer, since the efforts to induce germination, which so readily succeed in the case of the elliptic conidia, remain without any result. If, however, this function belongs to them, as is not improbable, this disastrous plant has a capability of propagation which is absolutely frightful. Apart from the conidia, which perhaps possess the power of propagation only during the summer, if 200 spores only be reckoned to each fruit, and on each square line of the surface of a berry only 100 fruit, which in moderately-fertile individuals is far below the reality, a berry five lines in diameter would furnish about $1\frac{1}{2}$ million of spores,* and consequently we can form no imagination of the quantity which even a small vineyard would afford.

How do the spores pass the winter? Probably on the earth, where they are carried by the rain which dissolves the cirrhi. If we reflect that the same mode of fructification belongs to the

* This quantity may at first sight seem excessive, but if we reflect on the dimensions given above, from accurate admeasurement with a screw micrometer, we shall find that it requires 27 millions to cover a square inch.

species of *Erysiphe* which grow on annual plants, as for example the Gourd, and that in these the spores can come into no connection with the seeds of the plant, we see it is quite indifferent as regards the propagation of the mould whether its productive bodies pass the winter on a portion of the mother plant or not; it is therefore more than probable that the generation of the following year proceeds from spores which have wintered in the soil and are carried by the winds to the leaves. If this be the case all hope is vain of destroying the spores sticking to the tree by washing the Vines during the winter with acrid solutions, and of preventing the recurrence of the malady during the ensuing year. I am on the whole more than ever convinced that we possess no remedy against this disease, which undermines so deeply the prosperity of so many properties.

TÜBINGEN, Dec. 24, 1853.

XX.—AMERICAN PLANTS. By Mr. John Saul, Nurseryman, Washington City, D.C., United States.

How seldom we see in cultivation some of the very finest herbaceous plants of the United States! and those we do find are anything but well grown. Having seen many in their native habitats, I will briefly describe the circumstances under which they grow, and suggest what I consider would be the best mode of culture.

Among herbaceous plants few surpass in beauty many exquisite varieties of Lily. *Lilium superbum*, *philadelphicum*, and others, seen in their native habitats, are superlatively beautiful. Having, at various times, seen the finest collections of *Lilium lancifolium* in England, and the past summers made me acquainted with a locality where the two first-named Lilies grow in great profusion, I had therefore an opportunity of judging correctly of their value. Grown in their native wilds, coloured under their own sun, I consider them equal in beauty to the finest varieties of *lancifolium*. Let us see what were the circumstances under which they grew. The locality was the banks of a stream, which passed through what is called in the States "low bottom meadow land"—a rich sandy alluvial soil of great depth and richness,

where other native plants grew in almost tropical luxuriance ; and in it the Lilies stood gloriously. Our last summer was one of the hottest and driest on record ; and never have the Lilies bloomed finer. In no plants are there greater mistakes made in cultivation than in the herbaceous plants of America. Our autumns are very dry and warm, consequently the bulbs are well matured. The past autumn, on digging up some roots, the earth about them was hard, and very dry—much dryer than you ever see the ground in England. The soil remains pretty much in this state until winter fairly sets in. The ground, in the first place, having a good natural covering of old leaves, &c., and this now overlaid with a heavy coat of snow, the bulbs underneath are as dry and warm as they would be in an English greenhouse, and far more so than in the borders of an English flower-garden. When spring comes round, the thawing of the snow, as well as rains, which we usually get at that season, thoroughly moisten the soil. This, with our hot sun, soon renders vegetation active, and such plants grow with extraordinary vigour. From their habitats, and the nature of our seasons, it may be said they never suffer for lack of moisture, with a tropical heat, from the time they fairly commence growing in spring until their growth is matured. The past summer they were in bloom from the middle to the end of July, during which time the thermometer in the shade, out of doors, ranged from 90° to 100° , and by night from 80° to 90° . Once fairly out of bloom, the stalks soon dry up. The latter part of summer being dry and warm, our bulbs soon sink into a state of repose. Need I say more than the above to any intelligent cultivator to show fully the absurdity of attempting to cultivate these plants out of doors in England? Get your roots any time from September to January ; pot in a rich sandy loam enriched with leaf-mould or cow manure ; place your pots in a cold pit as soon as they commence growing ; move into a warm greenhouse, or, better still, a well-ventilated stove ; give liquid manure frequently when growing,—rich feeding, with abundance of heat and air, is what they like ; they will then bloom finely. After which, get your growth well matured, which done, dry off gradually, and keep your roots perfectly dry until you want to start them again.

Included in the genus *Gentiana* are a few species which rank among the finest herbaceous plants ; but again, how seldom seen in cultivation ! *G. saponaria*, *ochroleuca*, and some others are charming. I will describe the habitats of the two named. They

will be found growing in low ground, like the Lilies, but in a different soil; the former appear on the richest soil, and where they can get more moisture when growing. These grow on dry banks, where the soil is frequently thin and gravelly, generally overhanging streams and ditches of water. In such situations—deep valleys—the climate during the growing season is hot and humid, whilst the roots, it may be, are running amongst gravel comparatively dry, and at other seasons perfectly so. How then can it be expected such plants will grow in the wet cold soil of an English herbaceous flower-garden? They are blooming finely in their native wilds the middle of September. In cultivating these plants, give a sandy loam with a little leaf-mould, but no manure; use a quantity of stones among the soil; and above all, whether in-doors or out, let it be thoroughly drained. In pots will be the better way to grow it, as it then can be given plenty heat when growing. Bear in mind careful watering when growing, and little or none at any other season.

Asclepias incarnata is a well-known fine herbaceous plant. In its native haunts it grows on “uplands,” which may be called dry, and exposed to a burning sun in summer. Many, or indeed most of the other *Asclepiads* thrive in a low moist soil, such as is favourable to the growth of the Lily; and frequently in the skirts of woods where the shade is not too dense. In such habitats may be found *A. nivea*, *verticillata*, and many others; but never *A. incarnata*. The former, when found growing where the soils are dry, and in company with *A. incarnata*, are generally very feeble, and, as a consequence, the treatment which suits one will not the other. Beautiful as is *A. incarnata*, some of the light coloured varieties are equally splendid; in fact they will compare with the finest *Hoyas*. Under cultivation these plants should be grown in a rich soil, in a very warm rather close house. They will repay any care given them, as no plants are more beautiful. I might run over many other plants which are equally beautiful, though lost sight of.

In order to give some idea of our hot summers, I will just observe a fact connected with *Kalmia latifolia*. This is one of the commonest undergrowths we have in our forests. Occasionally, when the “white man” clears away the native forest, he will leave some clumps of these near his residence; but they will soon dwindle gradually away under the burning suns of summer. In fact they must have shade to live; and when transplanted to our gardens it must be in a shady spot. What a contrast to England,

where they grow magnificently exposed! The soil in which *Kalmia* is generally found growing is a gravelly or sandy loam. In this soil also grow *Azalea nudiflora*, and others. Everything usually classed as American plants is grown in peat in England, a soil that many are never found growing in in their native habitats.

XXI.—SUGGESTIONS FOR EMPLOYING EVERGREENS AS A WINTER DECORATION IN FLOWER-GARDENS. By Messrs. Standish and Noble, Nurserymen, Bagshot.

(Communicated September 16, 1854.)

THE “massing” system of flower-gardening has, unquestionably, many points to recommend it, and it has also very many disadvantages. Place four months’ duration of the richest floral beauty against eight months of barrenness and disorder, and you have the question fairly stated—the verdict can only be arrived at by means of individual opinion.

It is not, however, the relative merits of different styles of flower-gardening which we now intend to discuss: but, simply, how to obviate what to most persons is a disagreeable set-off to the glowing masses of mere summer flowers, viz., the bare appearance of the beds for so many months after the flowers are faded.

The present subject has often been brought before the gardening public in the various horticultural publications, but, hitherto, very few if any practical results have been observed. Such results are, however, not only desirable, but comparatively easy of attainment. Some recent attempts enable us to offer a few hints that may possibly be of service to those who contemplate the addition of a very agreeable feature to their gardens.

To carry out the subject practically to any extent a few seasons’ preparation of some of the plants to be employed will be necessary, unless they are purchased from a nursery ready for the purpose, as dwarf bushy plants will mostly be required. The majority of kinds, however, which will be found most useful are naturally of such habits of growth.

Beyond making, in the first instance, a proper selection of plants and the subsequent attention required to bring them into a proper condition, the plan does not involve much additional

labour to the ordinary routine of flower-garden management. The mere filling of the beds in autumn, and removing the plants to the reserve garden in spring, when the summer occupants were ready to take their places, would form but a trifling item in the year's labour. The vast amount of young plants which has to be produced every season for the summer display would in the winter decoration be, in the main, dispensed with, for when once a proper stock was secure very few vacancies would occur; as a whole they could be employed for a long succession of years. This is a very great advantage in the system.

To many persons the frequent removal of the plants—twice in a year—appears to be a formidable barrier in the road to success. And to obviate this apparent inconvenience it has been suggested that the plants should be kept in pots to insure success in removal. This is, however, by no means necessary. Plants which are moved twice a year are *always* in a condition to transplant, and when, as in this case, they have merely to be taken from one part of the garden to another, it may be performed at almost any period of the year, if ordinary precautions are taken, with perfect success.

As a general rule the beds would be filled in October, and the plants returned to the reserve garden in May, months especially favourable for transplanting evergreens, especially when so well prepared as those would be which we are now treating of.

In filling the beds a pre-arranged plan will of course be carried out. The heights and colours of the plants employed will be taken advantage of to produce a pleasing combination, and the sameness in the height may be judiciously broken if desired by the introduction at regular intervals of taller plants having symmetrically formed heads.

In the matter of colour, too, there is much scope for variety, as a great diversity of hue exists in the plants which are suitable for the purpose, as will be seen by the list of a few which we append to this article.

But such a garden need not be wholly dependent on evergreens for its attractions. Various early-flowering bulbs, as the crocus, snowdrop, hyacinth, &c., may be introduced with very pleasing effect, either mixed with the dwarfer shrubs or in small detached beds, or a combination of both may be adopted. But, under any circumstances, the bulbs should be in pots, so that they may be readily removed with the evergreens, for at that season they would be in full growth, and could not, therefore, be safely trans-

planted in any other way, and if allowed to remain to complete their growth they would materially inconvenience the summer arrangement.

Many of the evergreens would also exhibit beauties other than those arising from their foliage, as the berries of *Mahonia aquifolium*, many of the *Hollies*, the *Gaultherias*, *Cotoneasters*, &c., &c.; and some would afford flowers, as *Andromeda floribunda*, the *Daphnes*, *Garrya elliptica*, *Laurustinus*, and *Ligustrum japonicum*.

Among the berry-bearing plants none would be more conspicuous than *Skimmia japonica*, its rich dark-green foliage forming as it were a back-ground upon which to set off the bunches of coral berries which are borne upon the summit of the branches. We anticipate for this plant, when its real merits are fully known, a place second to no other hardy evergreen known.

But so many and so various are the interesting plants that present themselves as candidates for such a garden as we are now advocating, that, setting aside mere gaudiness, we hardly know whether the winter aspect of our parterres could not be rendered more really interesting by their aid than by a combination of the richest "bedding" plants in summer.

At present we shall content ourselves with giving a short list of some of the more desirable plants for the purpose, hoping to return to the subject on a future occasion.

<i>Andromeda floribunda</i>	Ivies of sorts from dwarf beds
<i>Azalea amœna</i>	<i>Juniperus squamata</i>
<i>Aucuba japonica</i>	" <i>tamaricifolia</i>
<i>Berberis fascicularis</i>	<i>Kalmia angustifolia</i>
" <i>Darwinii</i>	" <i>myrtifolia</i>
<i>Buxus balearica</i>	" <i>latifolia</i>
" gold striped	<i>Laurestine</i> , common
" silver striped	" shining leaved
<i>Cotoneaster microphylla</i>	<i>Ligustrum japonicum</i>
<i>Daphne Froniana</i>	<i>Ledum buxifolium</i>
" <i>delabayana</i>	<i>Phillyreas</i> of sorts
" <i>Cneorum</i>	<i>Vaccinium ovatum</i>
" <i>hybrida</i>	" <i>buxifolium</i>
<i>Epigœa repens</i>	<i>Polygala Chamæbuxus</i>
<i>Ericas</i> , all the hardy dwarf sorts	<i>Rhododendron ciliatum</i>
<i>Euonymus japonicus</i>	" <i>glaucum</i>
" " gold striped	" <i>Wilsoni</i>
" " silver striped	" <i>ferrugineum</i>
<i>Garrya elliptica</i>	" <i>hirsutum</i>
<i>Ilex</i> of many kinds, green and variegated	<i>Skimmia japonica</i>

XXII.—PINE CULTURE IN SOUTH WALES. By W. P. Ayres, C.M. H.S.

HAVING recently visited several of the most noted gardens for the growth of Pine-apples in South Wales, it has occurred to me that a short account of what I have seen may not be without interest to the Fellows of the Horticultural Society, nor unworthy of a place in the Society's Journal. Wales has long been celebrated for Pine culture, the Providences of Rheola and some other places being noted for their size and excellence, when the writer of this was but a youngster in the art and mysteries of horticulture—but Pine-growing in those days was more the result of patience and perseverance, than vigorous development, and if a plant could be got to stand over two or three years longer than usual, that is, if it was five or six years old instead of three, and if it had increased in size during all that time, that was the plant looked to as likely to produce something extraordinary when it did start for fruit. But how often were these hopes doomed to be disappointed by resulting in feebleness rather than vigour, and fruit anything but proportionate to the size of the plant? That such should be the case does not surprise us at the present time, when effects have been traced to their causes, and when every person pretending to a knowledge of plant-management is aware that, without a good foundation at starting, it is impossible to proceed beyond mediocrity in cultivation.

Wales, as far as my short residence in the Principality enables me to judge, does not possess any natural advantages for Pine culture over other parts of Great Britain. The springs are cold and late; the summers sunless and showery, scarcely twenty-four hours passing consecutively without rain; indeed, autumn and early winter is the best time in Wales, and if some of our tourists who express themselves so much enraptured with the climate were to visit the country in spring instead of autumn, they would find little to remark upon, except the nakedness and lateness of the country, and almost incessant rain. The absence of sun is very remarkable, even in fine weather, and I cannot more forcibly express this fact than in the language of one of the most intelligent gardeners in the country, viz.:—"you may plant at any time, the sun not being likely to interfere with your success, and you may make sure of rain twice or thrice a-week, if not every

day." Those gardens situated near the sea have the advantage of a degree or two milder temperature, but that is all, and even that advantage is counterbalanced by the denseness of the atmosphere, especially during the winter season.

At Dowlais (Lady Charlotte Guest's), the garden is very unfavourably situated, having smelting furnaces on two sides, and so near as to completely illuminate the garden on dark nights. The smoke and sulphurous fumes from these is at times so dense and strong, that wall-fruit trees will not grow at all; in fact, no trees except the common Poplar will exist near this garden. It will therefore be seen that "that best of all Pine-growers," Mr. Jones, derives no advantages from local peculiarities, but on the contrary, I think his Pines, so far as situation is concerned, might as well be situated in Smithfield or Seven Dials. Neither can he boast of any of the so-called modern improvements of sheet-glass, &c., the houses being very old and in a very dilapidated state. Whence then the superiority of his productions? I will answer the question in a very few words, viz.: a good foundation properly carried out, by proper attention at the proper time and untiring assiduity. The plants, however, I may remark in passing, were generally not so large as I expected to see them, or as they had been described to me, but some few plants were very strong indeed. Ripley Queens more than four feet in height and strong in proportion, and a Providence more like a Yucca with recurved leaves than an ordinary Pine-plant. It was the opinion both of Mr. Jones and myself that this plant, if not larger, contained more stuff than the plants at Gunnersbury from which Mr. Mills produced the celebrated Pines; indeed nothing could exceed it in magnificence of appearance—it was in a word perfection of Pine-plant growing, and if Mr. Jones can only apply the finishing strokes of cultivation with his usual success, why I think Mr. Mills must look to his laurels. The plants described are growing in pots not remarkably large, but I suspect directly they indicate the fruiting time they will be planted out in some snug corner where everything they require can be readily supplied to them.

The plants in the general stock are not large (and, indeed, one of the chief and most remarkable characteristics of the Meudon Pines was their smallness, as compared with the fruit produced), but they were strong, thick, hard, and healthy, brimful of life-invigorating sap, which only requires husbanding until the proper season to develope itself in fruit of first-rate

excellence. The Pines are grown both in pots and planted out, some in loam and some in peat; but the loam is of a fine and unctuous character, soft as silk, and superior I think to the finest of what about London is known as "Epping or Wanstead Loam." The peat is of the soft kind, rich and spongy, and further enriched, I suspect, by proper and timely preparation before it is used for the Pines.

The structures used for the growth of the Pine consist of two pits, one 68 feet by 12 feet in the clear in which the plants are grown principally in pots, and the other 33 feet by 13 feet in which the plants are planted out in the open border. Succession plants are also grown so in tan-beds in the Vineries, but these are by no means good places for them. The pits and houses also are heated by steam pipes, and the smaller pit again has steam pipes passing through the bed for bottom-heat; the pits have moreover the advantage of strong dung linings, which I consider the sheet-anchor of Mr. Jones's success, for when the pits are opened the rush of the ammonia-impregnated moisture is almost overpowering. These pits are of the old-fashioned construction, with very flat roofs and common glass; in fact, there is nothing about these structures to induce the belief that any superiority can arise from them.

In the small pit the plants were planted out in peat, and surfaced with loam, and they stood about two feet apart. I have seen much larger plants than these were, but I never saw any in which health and vigour were so incontestably present. They are intended to be in cut in June and July, and at that time will be a sight worth seeing.

Next in point of merit to Dowlais may be mentioned Singleton (J. H. Vivian, Esq.), and here both the garden and Pine arrangements are quite new. This garden is in a very sheltered situation, and but a short distance from the sea, so that the atmosphere is milder than in more inland situations. Two houses are used, one for the cultivation of succession plants, and the other a pit in which they are fruited. In the former house the plants are in pots, but all the fruiting plants are planted out in a bed through which pipes pass for bottom-heat. The depth of compost, consisting mainly of peat intermixed with loam and charred rubbish, is about fourteen inches; and it is singular, Mr. Barron informs me, to see how the roots of the plants wrap themselves round and round the hot-water pipes. No provision has been made for nourishing the

bed from the bottom, Mr. B. considering it better that all moisture should proceed from the surface, and he finds no difficulty in providing a sufficiency of moisture at the bottom of the bed, and near the pipes. The heating apparatus is so arranged that both top and bottom-heat is produced at the same time, and without the use of stop-cocks. The pit is about 50 feet long by 16 feet wide. In building it the earth was excavated sufficiently deep to admit of the heating apparatus, or rather the pipes for bottom-heat being placed so that when the soil or compost is filled in to the depth of eighteen inches it is level with the surface of the surrounding soil. No side lights are used, but under each sash a framed shutter or ventilating door, about three feet by two feet, is placed, and the space between the doors, about two feet wide, and under each rafter is filled in with four-inch brickwork. Half of these doors are hung by hinges at the top, and the other half swing on pivots at the sides, the object being to have the ventilation as free and plentiful as possible. Air is also admitted by the top sliding lights, the roof is span, with a long light on the south side, and a short one on the north side. All these sashes are moveable and are glazed with common sheet glass at $2\frac{1}{2}d.$ per foot. The boiler for heating, one of Mr. Barron's own invention, is fixed at the west end, the pipes for surface-heat enter and traverse to the east end close by the wall, and return within three feet of the boiler, then for bottom-heat dip, return to the east end, return again and enter the boiler. On the north side the surface-pipes run by the end and back wall to the east end of the pit, then dip, and taking one turn under the bed return to the boiler. Of course the three lengths of pipe under the bed are divided equally over the surface. At first sight it may occur to practical men, as it did to me, that in this arrangement there might be some danger of getting too much bottom-heat in severe weather, but it will be observed that on the south side the heat traverses 80 feet before it enters the bed for bottom-heat, while on the north side, where the circulation is slower, it has to go 50 feet before it returns under the bed. As a point of economy it may be thought that as bottom-heat must be had in warm weather, it would be more economical to have had separate arrangements for top and bottom-heat, but Mr. Barron says he finds advantages rather than any disadvantage from the present arrangement, while he has saved the expense of stop-cocks, which are not only expensive, but are very frequently out of order. To ensure success in floriculture, air in large quantities must be

admitted, and hence Mr. Barron says he would rather hear, even in cold weather, the leaves rattling against each other, by the abundance of air admitted, than have the plants in a confined atmosphere from any inefficiency in the heating apparatus; in fact Mr. Barron says he finds he cannot admit too much air at any season, and hence his present arrangement is a material assistance to him, as the air being admitted by the side doors, it passes over and between the pipes, and becomes heated before it comes in contact with the plants. From this pit the Queen pines which took the first prize at Chiswick in July last were cut, and the smallest pine cut during the season was over four pounds; and at the present time (December) there is a smooth Cayenne just ripening, which I think will not be much short of seven pounds, and from a very small plant too. The Pines here have rather more room than at Dowlais, being planted two feet six inches to three feet apart; and some of the Providences are very fine indeed. On the whole, however, the plants are not so large as at Dowlais, but they are exceedingly good, and will doubtless, another season, produce to exhibitors some troublesome fruit to beat.

The Pine compost used at Singleton, as I have before intimated, consists of peat, loam, and some rough leaf-mould, and previous to use it is charred, the wood necessary for charring it being mixed with it, and then being laid out thin, sufficient strong manure water is added to thoroughly impregnate the mass with ammonia, and it is turned frequently, so as to get thoroughly ameliorated before use.

It will thus be perceived that though Mr. Barron does not use dung linings, he still has the advantage of a considerable portion of ammonia in the atmosphere, for we know that charred materials are great absorbents of ammonia, and hence with the stock stored up in the soil and the quantity periodically supplied in watering and syringing the plants, and damping the bed and pipes with weak clear manure water, the plants are supplied with a quantity of nutriment much in excess of what some years back would have been thought advantageous for the culture of the Pine. In this pit the plants are all planted out, some as suckers and quite small, but the majority, after they have had one season's growth in pots—in fact the pit is arranged every autumn after the principal stock of fruits is cut; then the largest of the succession plants are planted out, and if they do not increase much in size of plant afterwards it is very remarkable what splendid fruit they produce,

in consequence of the root action being so vigorous and uninterrupted. Mr. B. also keeps a much lower night temperature to his fruiting plants during the dark winter months than would generally be considered safe; indeed, he says he frequently lets the temperature fall as low as 45° to 50° , and even as low as 40° on very severe nights without any injury; but he keeps the bottom-heat all right, and hence the juices of the plants receive no check. Pines, however, will bear a much lower temperature than is generally believed. I once had a pit of succession plants frost-locked for more than a week, and not a plant was injured further than the tips of the leaves near the glass were a little discoloured.

Pines are also grown in excellent style at Pontypool Park (C. P. Leigh, Esq.) in Monmouthshire, Mr. James, the present gardener, having been very successful the past season at the metropolitan exhibitions. The arrangements there are not of modern date, the pits and pine-houses being heated with dung-linings and also by hot water; but Mr. James is doing away with the former, and confining himself entirely to hot water, both for top and bottom-heat. The plants here are grown both in pots and planted out; in fact, it appears to be the object to take the spring crop from pots and the main summer supply from plants planted in the open bed. At the time of my visit (Dec. 8) the houses were undergoing repair, but the stock of plants is of a very first-rate description, some Providences, Envilles, Lemon Queens, and Cayennes for another season's fruiting being remarkably fine and promising. The Pines here, both in pots and planted out, are grown in a rich soft reddish loam very liberally intermixed with charcoal in pieces of considerable size. This is one of the finest loams I ever saw, and the Pines evidently like it; but Mr. James said he had tried the experiment, and he found the plants produce fruit as fine in pure peat. This peat, however, it must be recollected, is none of your poor sandy stuff, covered with half-starved heath, and which crumbles to pieces directly it is touched, but it is a rich mass of vegetable matter, tough and spongy, and which when reduced either by fermentation or exposure to the ameliorating influence of a winter's frost, becomes light and porous as so much leaf-mould; hence the Pines produce roots as thick as the pen I am writing with, and the young points several inches from their extremities will be found covered with minute spongioles sucking up nutriment with the greatest avidity. But it cannot be

expected the same success would attend the poor peat before alluded to, though that intermixed with semi-decomposed leaf-mould, charred refuse, and some thoroughly decomposed or charred cow-dung might make a very passable substitute.

Another place from which I expect to see some first-rate Pine-apples is a garden recently established by R. Fothergille, Esq., at Aberdare; the gardener here is Mr. Floud, some years back gardener to Sir John Guest, at Dowlais, and at that time an exhibitor of first-rate fruit. At the present time his plants, bought in a few months back, are very promising; and from the examples of cultivation which I saw in November, I have no doubt, that during the ensuing season, Mr. Floud will again be found a formidable competitor. The plants here are planted out principally in peat, but I noticed also a liberal admixture of loam dust, which the plants evidently enjoyed. The Pine pits have adjoining a span-roofed Vinery; in fact, the Vinery being occupied by Musas as well as Vines, it is necessary that it should be lofty, and as it was also the wish of Mr. Fothergille that the whole of the principal plant and fruit-houses should be accessible from the dwelling-house, without the visitor being exposed to the open air, the fruiting Pine-pits have been constructed on the east and west sides of the Vinery, the sides of the Vinery forming the back of the Pine-pits, and the lights being made to open inside the Vinery; the Pines can be examined at any time without the plants being exposed to cold draughts. These pits are about ten feet wide, and are heated by hot water, both for bottom and atmospheric heat. An arrangement of this kind is economical, as saving the expense of a back wall, and with a little ingenuity a system of ventilation between the Vinery and Pineries might be established, which would be very advantageous, and by which a constant circulation might be kept up. The succession plants are grown in pots plunged in tan-beds in ordinary pits.

What strikes a stranger as the most remarkable feature, is the extraordinary strength with which the Welsh Pines, even from the smallest plants, throw up their fruit. I am sure I speak within the truth, when I state that some of the Queens produce stems to the fruit *five inches* in circumference; and I have seen scores of fruit twelve to seventeen pips deep! Of course such "shows," carried to maturity with the skill evidenced by the growers I have named, must result in the fruit which have earned for the growers, and for Wales, their and its well merited fame.

Wales has also its amateur Pine-growers, among whom I must mention Mr. Williams of Swansea, the proprietor of the *Cambrian* newspaper. Mr. Williams's Pinery is situated in the heart of the town, and connected with his printing office. His newspaper is printed by steam power, with one of Applegarth and Cooper's cylinder machines, and the waste steam from the engine is thrown into the Pinery for bottom-heat for the plants, not by a bed of stones as practised by J. D. Llewellyn, Esq., at Penllergare, and explained some years back in the *Gardeners' Chronicle*, but by throwing it into a chamber or vault covered by close boarding, in which circular holes, the size of the pots, are cut, and through which the pots are plunged into the vault beneath. Mr. Williams told me that he frequently found the roots protrude through the pots into the vault, a sufficient evidence that the plants enjoy the treatment they receive; and some small Queen Pines from succession plants, which had started prematurely, were as bright and perfectly swelled in November as could possibly be desired, and very superior to hundreds which I have seen at the Metropolitan exhibitions in the height of the season. Those who have steam power might thus turn the *waste* to good and profitable account, and this system of Pine-growing has also the advantage of being cleanly and very convenient for amateur management.

From the preceding detail it will be perceived the Welsh system of Pine-growing, if not an off-shoot, bears a close resemblance to the Meudon system, and is similarly successful in effect. That similar results may be obtained when the same pains in management are taken is quite certain, but they must not be expected the first season of growth. The fable of the "Frog and the Ox" would be as likely to be realised! With Pines of ordinary growth, you must first induce vigorous development of the young sucker; carry that vigour through to the fruiting state without a single check, and then it is possible you may have a sucker or two for future growth with something of the semblance of life about them. They should at the time they are taken from the mother plant be from a foot to eighteen inches long, as thick at the base as a good-sized broom-stick, and with leaves almost as broad as your hand. If, in addition to this, the suckers are taken from those plants only which have produced large and finely-formed fruit, there is a probability that you will in a short time establish a stock of plants from which large fruit will be the rule, and not, as is too frequently the case, the exception. The narrow

and long-leaved varieties of Queens are useless, and should be thrown away directly the fruit is cut, and another rule should be observed in private establishments, and that is never to grow more suckers than you require fruiting-plants, for if the suckers receive no check from the time they are taken from the mother plant until they are fully established and ready to fruit, it is certainly much better than that they should have formed part of a plant half-starved in their infancy, and many of which have already been thrown aside as useless. A good foundation properly carried out is the rule to observe in Pine-growing as in all other plant-growing; there must be no makeshift, but the attention must be continuous and at the proper time. At Aberdare Mr. Floud had had the curiosity to weigh some of the plants from which he had cut fruit, and the proximity in weight of fruit and plant was very remarkable. Plants of Queens producing fruit $3\frac{1}{2}$ lbs. to $4\frac{1}{2}$ lbs., generally weighing about the same, the difference rarely exceeding half-a-pound, sometimes in favour of and sometimes against the fruit.

These results were from pot-grown plants planted out to fruit, but I suspect plants fruited in pots would generally exceed the fruit in weight, partly from the fact of planted out plants producing the largest fruit, but more from the increased quantity of water necessary to swell fruit in pots, rendering the plants heavier. It would be singular if the simple fact narrated above should ultimately establish a rule by which, under good management, the size of plants should be a certain index of the weight of the fruit. I say under good management, by which I do not mean the largest plants, but plants in which at the time of fruiting, size, vigour, and maturity are relative terms. Such a result may be ranked among probabilities, and good Pine-growers would render a service in noting under their own management the experiment which Mr. Floud has commenced.

It will thus be perceived, that in Wales Pines are grown in first-rate style in various localities, in different soils and composts, but always with the same or a similar result, and I see no reason why other parts of the country should not produce equally good fruit if the same pains were taken. To sum up in a few words, the Welsh system may be said to consist of the following points:—

First. A thoroughly established sucker carried forward to its fullest development without the slightest check.

Secondly. Complete maturation of the plants by an abundant admission of air both day and night in favourable weather, which

they can afford to admit by the cheapness of fuel, enabling them to use sufficient heat in cold weather.

Thirdly. Cool treatment at the time the plants start for fruit, and

Fourthly. No check from the time the flowers begin to expand until the fruit is fully matured.

No suckers are allowed to grow upon the plants unless they are wanted, and then not more than one upon each plant, but Mr. Barron tells me he intends to grow no suckers at all, except from the scarcest varieties in future, but to plant out some old shoots, and from them take whatever stock he may require.

Thus I have given an outline of Pine-growing in South Wales, which practical men may readily fill up for their own advantage; and if my remarks should be instrumental in introducing a better system in other parts of the country, the object for which these lines were written will be fully attained.

December 14, 1854.

XXIII.—NOTES ON PEARS WITH REFERENCE TO THE SORTS
ENUMERATED IN THE SUPPLEMENT TO THE CATALOGUE
OF FRUIT-TREES PUBLISHED BY THE HORTICULTURAL
SOCIETY. By M. De Jonghe of Brussels.

I HAVE examined the Supplement to the Catalogue of Fruits published by the Horticultural Society; and this examination has given rise to the following short notes. It would be desirable, in my opinion, that the name of each fruit should be followed by that of the person by whom it was raised. This would be interesting in a historical point of view, and complimentary to those men who have devoted their lives, and part of their fortunes, to the improvement of the Pear, the results of which we at the present time enjoy.

DE JONGHE.

1. *Alberty.* Doubtless Albertine. (Van Mons.)
- 2². *Alexandre Bivort.* (From the collection of M. Esperen, of Mechlin.) This name was given by Berkman, successor to the late M. Esperen.
- 2³. *Alexandre Lambré.* (Collection Van Mons.)

2⁴. *Alexandrine Hélie*. (Van Mons.)

These three varieties are distinct by the foliage as well as by the fruit. 2² has been known for six years; 2³, ten; and 2⁴, twenty-five years.

Angora bears no resemblance to the Catillac.

12¹. *Arbre Courbé*. (Van Mons.)

20¹. *Baronne de Mello*. (Van Mons.)

23². *Belle Après Noël*. (Esperen.)

25¹. *Belle Julie*. (Van Mons.)

43¹. *Bergamotte Esperen*. (Esperen.)

44¹. *Bergamotte Libottont*. (Libottont, Brussels.)

44². *Bergamotte de Lourain*. (Van Mons.)

51. *Beurré d' Amanlis*. (Van Mons.)

All the synonyms have been given by the French.

53. *Beurré d' Aremberg*. A name given to this variety by the late Dr. Van Mons, because the seedling was produced in the Garden des Orphelines at Enghien, which formerly belonged to the house of Aremberg.

54¹. *Beurré Berckmans*. (Collection Van Mons.)

59¹. *Beurré Brettoneau*. (Esperen.)

61¹. *Beurré Burnicq*. (Esperen.)

62. *Beurré de Capiaumont*. (Capiaumont de Mons, 1786.)

62¹. *Beurré Clairgeau*. (Clairgeau de Nantes, 1847.)

68. *Beurré Easter*. (In all works this variety bears the name of Bergamotte de Pâques.)

72². *Beurré Kennes*. (Collection Van Mons.)

72¹. *Beurré Léon le Clerc*.

There are two distinct varieties, of which one under the name of Van Mons, of Léon le Clerc, of Laval, is somewhat delicate in our climate; the other is the Léon le Clerc of Van Mons, a very hardy variety; but there is no variety known under the name of Beurré Léon le Clerc.

72². *Beurré de Millot*. There is no Pear of this name. One exists under that of *Millot de Nancy*. (Van Mons.)

81¹. *Beurré Sterckmans*. (Sterckmans of Louvain.)

The seedling tree was discovered by Van Mons, who named it after the raiser, M. Sterckmans, the gardener.

82². *Beurré Superfin*. (Goubault of Angers.)

This name was given, at Angers, to a variety raised by Van Mons, and which bore, about twenty years ago, the name of Cumberland; this it received on the occa-

sion of a visit of His Royal Highness the Duke of Cumberland to the late Van Mons at Louvain, in the year 1833 or 1834.

- 82³. *Beurré Tuerlinckx*. (Tuerlinckx of Mechlin, 1846. Grosse Calebasse.)
- 84¹. *Beurré de Wetteren*. (Collection Esperen.)
- 100¹. *Bon Gustave*. (Collection Esperen.)
- 110¹. *Bouvier Bourgmestre*. (Bouvier, a pupil of the late Dr. Van Mons.)
- 127⁵. *Calebasse Tongard*. (Collection Van Mons.)
- 153³. *Choix d' Amateur*, read *Choix d'un Amateur*. (Van Mons.)
151. *Colmar, Autumn* [Syn. De Bavay]. (Van Mons.)
- 162¹. *Comte de Flandres*. (Van Mons.)
- 162². *Conseiller de la Cour*. (Van Mons.) Probably synonymous with *Maréchal de Cour*, *Poire Demanch*, &c.
- 179¹. *Délices de Charneau*. Doubtless *Fondante de Charneux*, or *Merveille de Charneux*, discovered about fifty years ago by M. Legipont in his garden at Charneux, province of Liège. The variety is not vigorous. The original seedling tree still exists at the above-mentioned place.
- 179². *Délices de Chaumont*. This is doubtless *Surpasse Chaumont*, *Trouvé à la Curé*; I should say it was found in the garden of the Curate at the village of Chaumont.
- 181¹. *Délices de Jodoigne*. (Bouvier.)
- 183¹. *Deux Sœurs*. (Esperen.) *Des deux Sœurs*.
- 198¹. *Doyen Dillen*. (Van Mons.)
198. *Doyenné Crotté*. (Van Mons.) A delicious fruit, but, owing to the weakness of the tree, it is not worthy of cultivation.
- 198³. *Doyenné d' Été*. (Van Mons.)
- 205⁵. *Duc de Nemours*. (Van Mons.)
- 216¹. *Eliza d' Heyst*. (Esperen.) The name, *Eliza*, is that of the wife of Berckmans, Esperen's successor, now in the United States.
- 231¹. *Fondante de Malines*. (Esperen.)
- 231². *Fondante de Millot*, *Mont Parisette*. Should have been written *Fondante Paniselle*; this variety was obtained by D'Hardenpont, in his garden at *Mont Paniselle* (*Cellarium Panis*), where there was formerly a church, dedicated to the heathen god Pan.
228. *Flemish Beauty* (of the English). This variety was found at *Heure*, a village in East Flanders. It is generally

- named in Flanders Bosch Peer, which signifies literally *Poire des Bois* or Wood Pear. The Belgium and French pomologists have given it the name of *Fondante des Bois* or *Beurré des Bois*. The variety named by the late Dr. Van Mons in compliment to his friend Sir Humphry Davy is quite another sort, much hardier, and the fruit ripens in January and February.
238. *La Fortunée d' Enghien*. This was obtained by M. Reumes, an apothecary in a village near Enghien. It was propagated and sent out by the late M. Parmentier; but it is too delicate to deserve notice.
250. *Glout Morceau de Cambron*. It ought to be written *Glou moreau*, the word Glou is Walloon, and signifies friand in French, as *Friand Moreau*, delicious bit, or delicious morsel. The name of Glou Morceau de Cambron is given by the common people to the *Beurré d' Hardenpont* [*Glou Morceau*] of which a strong specimen, grown on the pear stock, against a wall of the ancient Abbey of Cambron, facing the south-west, bears very fine fruit.
- 269². *Henri Caperon*. (Van Mons.) Should be written *Henri Capron*.
- 287². *Josephine de Malines*. (Esperen.) This variety is totally distinct from the Colmar Nelis; but like the latter it requires to be cultivated on a wall with a good aspect.
- 287³. *La Juive*. (Esperen.)
- 293³. *Lamartine*. (Van Mons.) Should be *De la Martine*.
- 293⁴. *Laure de Glymes*. (Collection Van Mons.) Rather a weak-growing variety.
- 297¹. *Louise de Boulogne*. (Van Mons.)
- 299². *Louise d'Orleans*. (Van Mons.) Syn. *Reine des Belges*.
- 300¹. *Lucien Le Clerc*. (Van Mons.)
- 309¹. *Maréchal de la Cour*. (Van Mons.)
- 311¹. *Miel de Waterloo*. (Van Mons.) Syn. *Désiré de Waterloo*.
- 311². *Millot de Nancy*. (Van Mons.) See Note at 231², *Fondante de Millot*.
323. *Napoléon*. (Liard.) Raised from seed by M. Liard, of Mons. This Pear is generally called (in Belgium) *Bon Chrétien Napoléon*, because its form is that of the type of the *Bon Chrétien*s, which is a distinct form between the *Bergamottes* and the *Colmars*.
325. *Nelis, Winter*. Read *Colmar Nelis*.

- 327¹. *Neuf-maisons*. (Van Mons.)
- 328¹. *Nouveau Poiteau*. (Van Mons.)
- 339¹. *Passe Colmar Musqué*. (Esperen.)
- 339². *Passe Colmar Tardive*. (Esperen.) It is called *Passe Tardive*.
- 345¹. *Pie IX*. (Collection Van Mons.)
- 352¹. *Prévost*. (Collection Van Mons.) This is called *Poire Prévost*, because the fruit, having not yet shown its definite form, could not be ranked amongst any of the admitted denominations. Perhaps it should be classed among the *St. Germain*s.
- 352². *Princesse Charlotte*. (Esperen.)
- 366¹. *Russelet de Meester*. (Van Mons.)
- 380¹. *Saint Jean Baptiste*. (Van Mons.) One of the most vigorous of the varieties raised from seed by the late Van Mons. It succeeds as well on the *Quince* as on the *Pear* stock.
- 395¹. *Simon Bourier*. (Bouvier, of Jodoigne.)
Soldat Laboureur. (Esperen.) Is quite different from the *Beurré d'Aremberg*. This confusion originated in France.
- 396¹. *Sorlus*. (Van Mons.) It is called *Sorlus*, or *Poire de Sorlus*. A handsome pyriform fruit.
- 396². *Souvenir d'Esperen*. There are three varieties under this name :—
 1st. *De Bouvier*. (Collection Bouvier.)
 2nd. *De Berckmans*. (Collection Esperen.)
 3rd. *De Bivort*. (Collection Van Mons.) The latter is the best of the three.
- 409¹. *Suzette de Bavay*. (Esperen.)
- 412¹. *Théodore Van Mons*. (Van Mons.)
- 415¹. *Triomphe de Jodoigne*. (Bouvier.) This is the most vigorous and hardy variety in cultivation.
416. *Urbaniste*. (Coloma.) Found by the Comte Coloma in the garden of the Convent des Celestines, at Mechlin.
422. *Vezouzière*. (Léon le Clerc, of Laval, France.) The variety is rather delicate in the climate of Belgium.
- 436¹. *Willermoz*. (Collection Van Mons.)
- 441¹. *Zephirin Grégoire*. (Grégoire de Jodoigne.)

N. B. All the varieties of Pears sent out for the last six years by M. Berckmans, came from sowings by the late M. Esperen ; and all those sent out by M. Bivort for the last seven or eight

years, were from the sowings of the late Dr. Van Mons. This is why I have written, Collection Esperen; Collection Van Mons.—*Summ cuique.*

DE JONGHE.

XXIV.—HOW TO REGENERATE OUR FRUITS. By Mr. T. RIVERS, F.H.S., Sawbridgeworth.

THIS branch of fruit culture is so full of interest, so worthy the attention of all pomologists,—above all, has been so strangely neglected of late years in England; indeed, since the early life of the late T. A. Knight, no attempts to raise seedling Pears have been heard of,—that our thanks are due to M. de Jonghe for having brought the matter before your readers. For some twenty years or more, I have occasionally raised Pears from seed, and must confess that my success has been nothing to boast of; but latterly I have in a measure changed my mode of operations, so as to make raising of seedling Pears far more interesting than merely sowing the pips of a good Pear, without naming them, grafting the young shoots from the seedlings, and waiting till they bear fruit. My method is, I flatter myself, better adapted to our climate than that given in p. 21, and less disappointment is liable to arise from vermin, and the uncertainty of our springs, for seedling Pears are very apt to be pulled up by birds, the pips destroyed by mice, and in a showery and cold April to be eaten up by slugs and snails. As soon as the Pear-eating season commences, I have some two or three dozen nine-inch pots filled with a compost of loam and rotten manure, say two-thirds of the former to one-third of the latter; some sand added will improve it; these pots are then placed on bricks or tiles to keep out the worms, in some convenient situation (away from hedges, as they harbour slugs), near the house, and in each pot is a smooth slip of deal, painted, ready to be written on: I will assume it to be October; I am eating a fine specimen of the Louise Bonne Pear; the pips are plump and brown. I take them from the core carefully, go to one of the pots of earth, and with my finger and thumb press in the pips one at a time, to about an inch deep, and level the surface with my hand. I then write on the label, say, “ Louise Bonne Pear, Oct., 1855; ” a

piece of slate or tile is then placed on the pot, so as to completely cover it, and prevent the ingress of mice.* A few days after this I may be again eating a Louise Bonne Pear. I reserve the pips, remove the covering from the pot, and plant them with the others, and so repeat this till some fifteen pips are planted in one pot, which will raise quite enough trees from one variety. Again, it is February; I am at my dessert; a delicious Josephine de Malines Pear gives me some fine pips; my pots of earth are frozen; I place them in paper, and write the name on it. I then have a pot of earth taken to the greenhouse, or, in default of such a structure, to the kitchen, plant the pips as above, write on the label "Josephine de Malines Pear, Feb., 1855," cover the pot as before directed, and place it out of doors; early in March the covers must be taken off: the young plants from the pips sown in the autumn will make their appearance early in March if the weather be mild; those from pips sown in February or March will not vegetate till April or May, and the pips sown in May will probably remain dormant till the following March. There are two methods of managing young Pear seedlings: the first is the most simple, and well adapted for those whose hands are full of gardening matters; it is merely to let the pots stand on the bricks in full sunshine all the summer, giving them abundance of water; each young tree in the autumn will, or ought to be, from twelve to eighteen inches in height, and its stem as thick as a quill, and well ripened; about the end of October, these seedlings may be planted out in the garden, in rows, three feet row from row, and eighteen inches apart in the rows; and in March following, if there is a wish to bring them rapidly into bearing, each young seedling tree may be cut down to within two inches of its base, and one or two scions made from it (one ought to be enough, and that made from the lower part of the shoot); these should be grafted on to some stout stocks, or on to branches of a bearing tree: an excellent method is to buy at a nursery old dwarf Pears without names at a cheap rate, to plant them out one year, and then to rind-graft them (this is to insert the grafts between the bark and the wood) with the seedlings. They should be headed down to a stump, nine or ten inches in height in February. In April the bark will part

* The most eligible of all covers for seeds that remain some time in the ground, is the perforated plate of which I send a specimen. I have used these about fifteen years, having then been driven into inventing them, from the ravages of mice and birds.

readily, and they may be grafted; they will soon make nice pyramidal trees, and by being removed biennially, they will come into bearing quickly, and not occupy much room: every sort should be labelled with its origin in this way: "From Marie Louise, Nov., 1854," and so on: this labelling gives much interest to the culture of seedling Pears; for while waiting six or seven years till they bear fruit, their habits will be found very interesting, and in most instances a strong family likeness to their parent may be distinguished in the leaves and shoots of the young trees, varied by now and then a puny, weakly youngster, which will canker and die in three or four years, and then by some one or two trees in ten showing a wide departure from the parental stock, making vigorous and thorny shoots, and growing as much in one year as other members of the family in three, contrary to the views of parents and "pastors and masters" in general; it is these runagates which give the liveliest hopes to the raiser of Pears. I have at this moment several rows of seedling Pears five years from the graft; they were grafted on old dwarf Pear-trees, and have been lifted and re-planted twice; this has checked them, so that they are now in a bearing state; they are all labelled with their origin, and I have made the following remarks. Among some fifteen or twenty trees (labelled "From Ne Plus Meuris"), all remarkable for their resemblance to their parent, are two of extra vigour; among the same number, from Beurré d'Aremberg, are three thorny vigorous subjects; and this goes on in the same proportion with Bergamotte d'Esperen, Josephine de Malines, Fondante de Noel, and other seedlings raised from new kinds of Pears. Thus far I have given the most simple method of raising seedlings by sowing in pots, and not transplanting them till the autumn. Another method is to place the pots in a gentle forcing-house, either in January or February; the young plants will soon make appearance, and when they have made four leaves in addition to the seed-leaves, they should be raised carefully, with all their fibres, and potted into three-inch pots. As soon as these are full of roots they should be shifted into larger pots, and kept growing rapidly under glass till the beginning of June; they may then be planted out in rich light soil, and the probability is they will be three feet high by the autumn. It remains to be seen whether a seedling Pear can be brought into an earlier fruit-bearing state by being grown under glass all the summer, and gently forced so as to give it a long season of growth. I commenced

the experiment some years ago, but the cares of an active life prevented me carrying it out fully.

The most scientific mode of raising new Pears from seeds, is to sow the pips only of such fruit as have had their origin from fertilised blossoms. If the late T. A. Knight had not taken the old Swan's Egg Pear almost constantly into his experiments, so that most of his seedlings have too strong a leaning to it, and had taken such Pears as Glou Morceau, and Old Colmar, or the Winter Nelis, with some large late Pear, and also formed other crosses, with his peculiar tact, we should most probably have had some of the finest Pears in the world. The late John Williams, of Pitmaston, raised new sorts of Pears with great facility by fertilising. Some of these partake of the qualities of both their parents in a remarkable degree; but he was not careful enough in selecting varieties to a given end, which ought to be raising of hardy large late-keeping Pears. We have October and November Pears without end; their names are Legion, and serve to create a distaste, rather than a wish, for a collection of Pears.

To raise new and fine late Pears, a word or two as to the selection of proper kinds as parents, may not be amiss. That fine large late Pear, Léon le Clerc de Laval, reckoned a baking Pear, but which in May and June becomes soft and agreeable, should be crossed with the Winter Nelis, the most delicious of all winter Pears. The Easter Beurré, which, although in France the finest of late Pears, is in England generally flat and poor in flavour, may be crossed with the Beurré d'Arenberg, always vinous and racy, or with the Bergamotte d'Esperen; the Triomphe de Jodoigne Pear with Josephine de Malines, and so on. There are two methods by which fertilisation may be brought about: one in which chance is to a certain extent trusted to; this is by training the bearing-boughs of two Pear-trees on a wall, so that the blossoms are mingled; or planting two pyramids of the two kinds of Pears selected, in a situation far removed from any others. The certain method is to select a blossoming spur, or rather say a bunch of blossoms, and a day or two before they expand to cut out all but three or four; watch these narrowly every morning, and the moment the flowers expand (or even before expansion), remove all the anthers, cover the blossoms with a fine piece of muslin, and the following day fertilise the flowers with the pollen of the variety fixed upon to cross with. This is done simply by finding some flowers in full bloom with the pollen perfect, and placing them on the blossoms under the muslin cover, closing it

immediately, and tying it securely so as to prevent the ingress of bees. To those who have inclination and leisure, this occupation will be found of much interest; and to those who have not, the chance method will be found equally so. The reproduction of some of our favourite sorts of Pears, such as Marie Louise, and Winter Nelis, in a pure state but hardier than they are at present, and the latter of a larger size, ought also to be attempted. This should be done by thinning out the blossoms on a spur before they expand to three, and then enclosing them with a piece of muslin. This will be a most interesting experiment; for a pure and unstained Winter Nelis Pear as large as a Beurré Diel, with the hardy habits and blossoms of the Eyewood, will be of much value; or a Marie Louise as hardy as the latter, and keeping till February.

The theory and practice of the late Van Mons, which for so many years has made so much noise on the Continent, has been given in your pages; but I may, I trust, be allowed to repeat it in as few words as possible.

His theory was that Pears could be improved by raising seedlings from successive generations of Pears, without taking care that the blossoms were prevented from being stained. He commenced by sowing the seeds of some hardy inferior Pear, and as soon as the trees bore fruit he sowed the pips from them; waiting again till this second generation bore fruit, from the pips of which he raised trees, and so on for several generations. He gave out to the world that by this method he raised all his best Pears, and that those of the last generations were nearly all good. This seems to be in unison with the well-known fact, that cultivation brings on amelioration; only I have often thought he should have commenced with Marie Louise; but his assertion that by thus raising successive generations, his last seedlings became so fruitful as to bear some years earlier than those raised in the ordinary way was a delusion, brought on I suppose by enthusiasm. That some out of his many thousands of seedling Pears would bear fruit some years before others, I have no doubt; but that it resulted from the system was an error. Let any one of your readers raise seedlings from the Old Swan's Egg Pear, and at the same time raise some from one of Van Mons' Pears, say Prince Albert, which, as being one of his late generations, ought to give seedlings wonderfully prolific, it will be found that the chances are equal about the seedlings bearing fruit when young. I am inclined to think that those from the *very old* Pear, the Swan's

Egg, will bear fruit before those from the *very new* Pear, Prince Albert ; for my seedlings raised from old varieties have hitherto borne fruit just as early as those I have raised from the new sorts of Van Mons. I am inclined also to think that his system of amelioration by successive generations, although on paper attractive and interesting, and, as I have said, in unison with facts, was as slow and uncertain as raising Pears from seed in the common chance way, for the following reason. Some few years since I was travelling in Belgium, and paid a visit to the garden of the late Major Esperen. I learned that he had no system of raising Pears ; but that he sowed seed according to his fancy, and trusted to chance. I was surprised to find that he had raised in a comparatively small garden, and out of a small number of seedlings, such Pears as Josephine de Malines, Bezy d'Esperen, Fondante de Noël, Fondante de Malines, and some others. I afterwards saw the vast collection of Van Mons ; thousands of large trees raised from seed after his system : among them all, it may safely be said, there was not one variety to surpass, or even to equal, the two first-named varieties raised by chance. To chance also, and not to this much vaunted of systems, we owe such Pears as Marie Louise, Glou Morceau, Beurré Rance, Beurré d'Aremberg, and, above all, Winter Nelis ; so that we may console ourselves with the idea that chance is very liberal, and the system of Van Mons not so ; for after a whole lifetime devoted to it, it failed to give him five Pears to *surpass* the above, or to equal the last-named.

I remember, when first I heard Van Mons talk of his theory, feeling assured it was not tenable, only I was in great awe of him ; for I thought if amelioration is progressive in seedlings raised in successive generations without crossing ; and if, in like manner, fertility is increased by it, the Peach orchards in America would give fruit perfect in quality and of wonderful fertility, for the Peaches in some of the States are raised, generation after generation, from the stones. What wonders the fortieth generation of Peach-trees ought to be in the United States ; for they should bear the first year from seed, according to the theory of Van Mons.

Among the hundreds of varieties of Pears with the name of Van Mons attached to them, there are some very good, although by far too many are sorts ripening in October or November. By raising Pears from seed in England, we shall have sorts better adapted to our climate, and of equal or perhaps better quality ;

for our gardeners will not trust to a false system and thus waste time, but by judicious cross-breeding will soon produce hardy Pears, worthy of a place in all our gardens.

I have noticed, these last few years, a peculiarity in some of my seedling Pears, worthy perhaps the attention of the physiologist. It is this:—the first one or two seasons of a seedling Pear giving fruit, I have found the blossoms to withstand completely the sharp frosts in spring, while seedlings that have been in bearing from five to seven years have succumbed to their effects; in like manner with the older varieties. I formed a special theory for this as follows,—but I must first mention that I graft all my seedlings on bearing trees, cutting down for the purpose trees of seven or ten years of age—now it occurred to me, that at first the seedling had more of freshness and power in itself, and therefore withstood the effects of frost; after a few years there was a closer amalgamation, and the graft had imbibed, so to say, the nature of the stock (which in my experiments has generally been some old variety), and had accordingly lost power. In the spring of 1853, several seedlings that bore fruit for the first time, withstood the adverse effects of the season, for although all the Pear-trees in their neighbourhood failed to give fruit, almost every blossom on them set, and they bore a full crop; in the spring of 1854, two or three seedlings gave blossoms for the first time, and were in full bloom, in common with the other varieties of Pears, on the 25th of April; the blossoms on all the Pear-trees growing near the seedlings were killed, but on them scarcely one was injured, and nearly all gave perfect fruit; the seedlings that had been in bearing several years, suffered, but not to the extent with the other Pears. I was, as I have said, inclined to think the vital energy of the last-mentioned seedlings impaired by the stocks being old tender sorts; but my theory gave way, for I found that all the new Pears of Van Mons, which I have received from Belgium for some years past, as soon as they have been distributed, and of which I had healthy trees grafted on young Pear-stocks raised from seed, and which new Pears I presumed were of the fifth and sixth generation, and accordingly very hardy in their nature, according to his theory, all failed to give fruit, all the blossoms, of which there were abundance, being killed by the frost; so that I am still at a loss to account for the blossoms of my two or three seedling Pears being able to withstand eight degrees of frost on the 25th of April, 1854, while those of new hardy Belgian sorts, grafted on young stocks and full of health

and vigour, all failed; unless it is, that English seedlings will brave our English climate: let us hope so, and all of us commence to regenerate our fruits, and make them better adapted to our climate than they are at present.

We must not rest with Pears; all our fruits deserve attention to bring about that desirable quality, hardiness. Why should we not have a pure Ribstone Pippin growing on a tree hardy and not liable to canker? and why should we not have the Golden Pippin regenerated? Our only chance of this end is to raise seedlings from blossoms carefully protected from any stain, by enclosing them in fine muslin, as directed for Pears in this article; by this means also we shall be able to have some of our favourite peaches, such as the Grosse Mignonne and Solande, with the qualities of their fruit unimpaired, but the habit of the trees (to coin a word) hardenised. I hope one day to be able to treat this matter more at length. I can only say, that my attention has been strongly drawn to the developing of this system of regeneration, by my having raised from seed, Plums from delicate varieties with habits most robust and hardy; and a Nectarine partaking of all the desirable qualities of its parent in its fruit, but of the most robust and vigorous habit; in short, the old varieties made young: and I feel assured that although we shall not be able to grow Peaches on standards in the open air, we shall have seedling Royal George and Noblesse peaches growing on our walls, free from mildew and curl, and all other Peach maladies.

XXV.—NOTES ON PEARS RECEIVED IN THE AUTUMN OF 1854,
from M. De Jonghe, of Brussels, and from Mr.
Langelier, St. Héliers, Jersey. By R. Thompson.

MANY of the new kinds of Pears being yet unknown in this country, owing to bad springs, or in consequence of the trees having been but recently introduced, and therefore not in a bearing state, the following notes have been made with the view of affording, in the meantime, some useful information to those interested in Pear culture. It cannot, of course, be pretended that descriptions taken from foreign specimens can be perfect as regards the respective varieties, when they come to be fruited in

this country: nevertheless, as the fruit was tasted in comparison with other sorts accompanying them, and of which the qualities are well known to be good in fruit produced here, there is every probability that the estimations which have been made with regard to the following varieties will be borne out by subsequent experience.

D'Arenberg Parfait. Langelier.

Fruit large, irregularly shaped. Stalk fully an inch in length, rather thick, and at its insertion somewhat fleshy. Eye large, open, with the segments of the calyx projecting. Skin greenish, sprinkled and patched with yellow or brown russet. Flesh coarse, very gritty near the core, inclined to become mealy, sweet, but in the present instance not rich. Season, December, January. It is too gritty to be recommended.

Belle de Troyes. Langelier.

Rather small, obovate; eye open. Skin covered with reddish russet. Flesh coarse, and of very indifferent flavour.

Bergamotte Esperen. (Esperen.) De Jonghe.

About the size of the Easter Beurré, and resembles it in colour and texture of the skin, but the stalk is longer. Flesh tolerably smooth and buttery, and doubtless the variety will prove highly deserving of cultivation, but owing to a speck from carriage, the flavour could not be properly ascertained. The specimen was tasted in February; but the variety is stated to be in perfection from January to April.

Beurré Bronzé. Langelier.

Rather above middle size, obovate, skin smooth, yellowish green, sprinkled with dark brown dots. Flesh white, coarse, with a sweetish bad flavour. Season, December. Not worthy of cultivation.

Beurré Clairgeau. (Clairgeau, Nantes.) De Jonghe. Fig. 1.

Grown on a pyramid, on the Pear-stock.

Fruit large, pyriform. Eye open, in a shallow depression. Skin yellowish, dotted with brown, with a blush of red next the sun. Flesh fine, melting, buttery, and rich. The

fruit has considerable resemblance, in appearance and flavour, to the Beurré de Capiaumont, but it is said to grow larger, and the foliage is different.

Other specimens, grown on Quince and tasted on the 18th

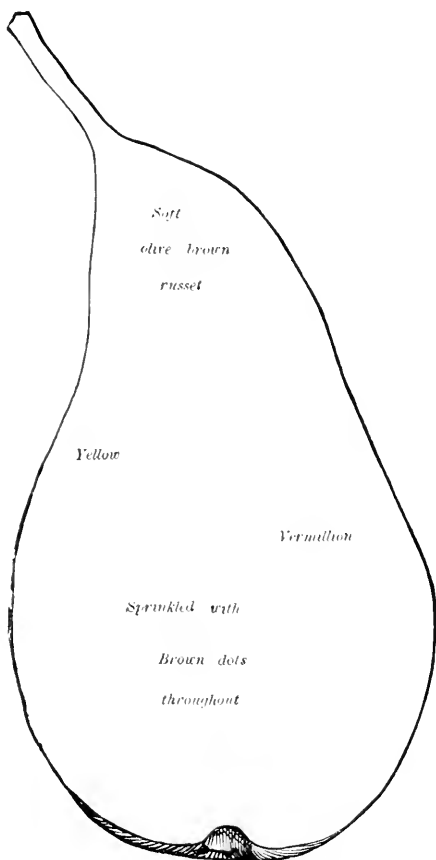


Fig. 1.—Beurré Clairgeau.

of November, were found very melting, high flavoured, rich and excellent; as were likewise those grown on the Pear-

stock, but more gritty. In both cases the fruits were considered as good as those of the Brown Beurré.

Beurré Delfosse. (Grégoire.) De Jonghe.

Fruit middle-sized, obovate. Stalk a little more than an inch in length, of medium thickness. Eye small, in a slight depression. Skin pale, dull, yellow, thickly sprinkled with small brown dots, and speckled with cinnamon russet. Flesh white, melting, very juicy and sugary, with a slight perfumed flavour. A good melting pear but not high flavoured, and cannot be compared to Beurré Clairgeau. Its maturity is said to take place in December and January, but, probably owing to carriage, the specimens ripened in the end of November.

Beurré Duhaume. Langelier.

Fruit scarcely middle-sized, roundish or somewhat turbinate, of a deep russet brown colour. Flesh yellowish white, melting and juicy, but rather gritty near the core, rich but not equal to the Passe Colmar, which it somewhat resembles.

Beurré Gens. De Jonghe.

Middle-sized, obovate, tapering to the stalk, which is about an inch in length, thickened at its insertion. Eye slightly sunk, partially open. Skin pale greyish-green. Flesh mealy.

Beurré Gris. De Jonghe.

Rather above middle-sized, obovate. Stalk obliquely inserted, nearly an inch in length. Eye open, in an evenly formed cavity. Skin yellowish brown, speckled with russet, with which it is entirely covered near the stalk. Flesh white, granular, sweet, and very good, but is apt to decay at the core. This is very different from the Beurré Gris which is synonymous to the Brown Beurré.

Beurré d'Isambert. Langelier.

Middle-sized, obovate, eye open, with the segments of the calyx reflexed. Skin thickly and entirely covered with cinnamon-coloured russet. Flesh breaking and rather astringent. Probably a good stewing Pear. It resembles the Grande Bretagne Dorée.

Colmar d' Aremberg. (Van Mons.) De Jonghe. Fig. 2.

Fruit large, turbinate. Stalk scarcely an inch in length, of moderate thickness. Eye rather deeply sunk. Skin pale yellow with a faint blush of red next the sun, and slightly russeted near the eye. Flesh melting, rich and excellent. Season, November.

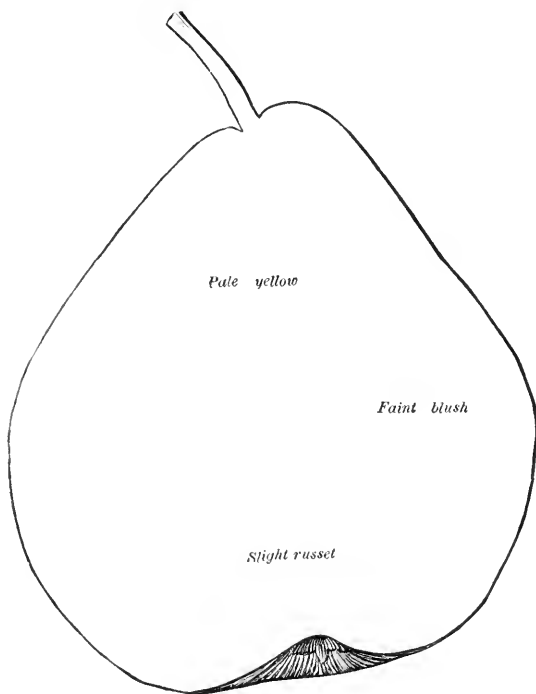


Fig. 2.—Colmar d' Aremberg.

Beurré de Louvain. Langelier.

Fruit middle-sized, roundish, obovate. Stalk about an inch in length, moderately thick. Eye shallow, in an evenly formed slight depression. Skin covered with soft smooth greenish russet. Flesh greenish-white, buttery and melting, with a sweet perfumed flavour, resembling that of the

Bergamotte Cadette, with which comparison should hereafter be made with fruits grown under similar circumstances.

Beurré de Bongres. (Durandau.) De Jonghe.

Fruit large, pyriform. Eye open, in a shallow depression. Stalk about an inch in length, scarcely of medium thickness. Skin tolerably smooth, although covered with light cinnamon russet; sprinkled with pale gray dots, and slightly tinged with bright red next the sun. Flesh white, juicy and melting, with a rich, refreshing subacid flavour. Season, October.

Blanc Perné. Langelier.

Rather large, obovate. Skin entirely covered with cinnamon-coloured russet. Stalk slender; rather more than an inch in length. Eye shallow, open, with the segments of the calyx projecting. Flesh yellowish-white, half buttery and melting, tolerably rich and sugary. It is said to keep sometimes till May or June, and on this account it deserves cultivation; for it is a much better Pear than the *Fortunée de Parmentier* which will keep till that time, but has little merit besides that property.

Poire Clemence. De Jonghe.

Fruit small, obovate, yellowish russet. Flesh yellowish, scarcely melting, somewhat perfumed, but deficient in flavour. It may, however, deserve further trial. Season, February.

Gros Colmar de Van Mons. Langelier.

Fruit large, Colmar-shaped. Stalk about an inch in length, of moderate thickness. Eye closed with the segments of the calyx. Skin greenish yellow, sprinkled with russet. Flesh yellowish white, melting, buttery, and rich. The flavour resembles that of the *Beurré Diel*.

Dumont Dumortier. (Stas.) De Jonghe.

Fruit scarcely middle-sized, obovate or oval. Stalk about an inch in length, of medium thickness. Eye open, in a slight depression, the segments of the calyx reclining on the sides of the cavity. Skin smooth, pale yellow, sprinkled with small brown dots. Flesh white, melting, buttery, sugary, and rich, partaking of the flavour of the *Passe*

Colmar. Season, December. A very nice little Pear; above second quality.

Esperen. (Van Mons.) De Jonghè. Fig. 3.

Fruit middle-sized, oblong-ovate, pale yellow, with a tinge of vermillion next the sun. Flesh white, buttery, rich and sugary, with an agreeable perfume. Season, October.

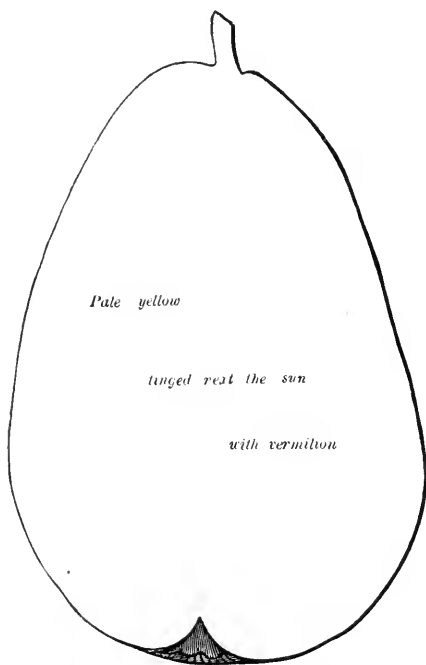


Fig. 3.—Esperen.

Colmar Nelis, De Jonghe,

And *Colmar Nelis*, Langelier,

Both appear to be the *Passe Colmar*.

Doyenné des Chasseurs. Langelier.

Half melting, tolerably rich and sugary, but scarcely

equal to the Passe Colmar, which in flavour and appearance it somewhat resembles. Season, January.

Duchesse de Berri. Langelier.

Same as Uvedale's St. Germain.

Duchesse Delost. Langelier.

Smooth, yellowish; stalk long, curved. Eye open, with the segments of the calyx projecting. Flesh half melting. Flavour very indifferent. Season, December. Not worthy of cultivation.

Gloire de Binche. (Gaudière.) De Jonghe.

Skin golden yellow, slightly sprinkled with brown. Flesh yellowish white, melting, buttery, and tolerably rich, but scarcely equal to that of the Passe Colmar, which it somewhat resembles. Season, January, February.

Poire de Groseiller. Langelier.

Middle-sized, obovate or pyriform. Stalk an inch and a half in length. Eye rather deeply sunk in an evenly-formed cavity, on the sides of which the segments of the calyx recline. Flesh yellowish white, tolerably well flavoured, but too gritty. Season, January.

Léopold I. (Bivort.) De Jonghe.

Fruit scarcely middle-sized, obovate. Stalk an inch and a quarter in length, with a fleshy projection on one side at its insertion. Eye open, with the segments of the calyx prominent. Skin smooth, pale yellow, sprinkled with brown dots. Flesh white, melting, buttery, juicy, and rich, with slight perfume. The specimen, however, was considered scarcely first-rate. Season, December.

Marjolle. Langelier.

This proves to be the Passe Colmar.

Ne plus Meuris. De Jonghe.

Skin covered with cinnamon-coloured russet. Flesh coarse, gritty, bitter. Quite a different Pear from the well-known irregular-shaped, roundish, rather unsightly, but very excellent late sort, known in this country under the above name. There must be some mistake in the one now

received from M. de Jonghe; for it is very bad, and altogether unworthy of cultivation.

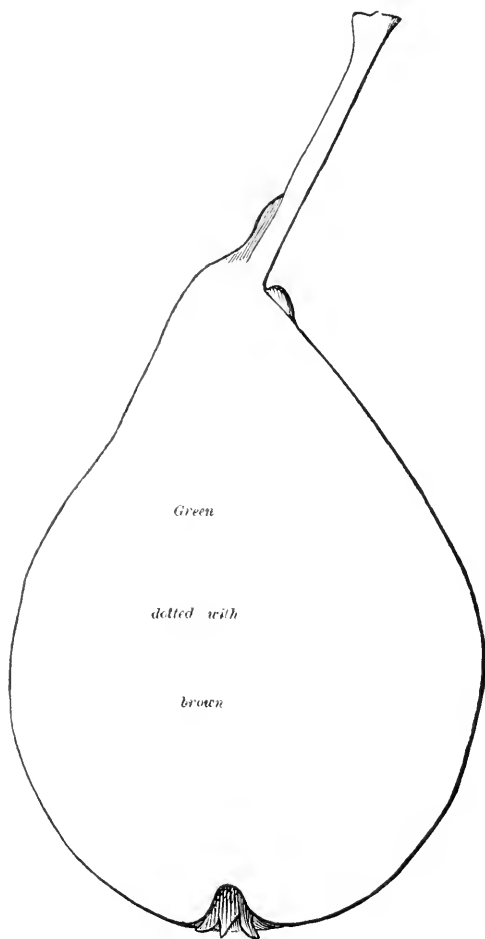


Fig. 4.—Nouveau Poitou.

Nouveau Poitou. (Van Mons.) De Jonghe. Fig. 4.

Fruit above middle-sized, obovate, tapering a little to the

stalk, which is about an inch and half in length, with a fleshy projection on one side, at the insertion. Skin green, dotted with brown. Flesh, melting, buttery, very juicy and rich, slightly subacid and highly refreshing. An excellent Pear. It partakes of the nature of the Brown Beurré, when the latter is ripened under favourable circumstances. Season, October and November.

Passe Colmar Doré. Langelier.

This is the *Passe Colmar*.

Passe Colmar Musqué. De Jonghe.

This has all the characters of the *Passe Colmar* when grown well exposed on a standard or pyramid. The stalk, the eye, colour, and flavour all agree. It is certainly not different from the *Passe Colmar*.

Has *all* the quality of the *Passe Colmar*, nothing more.

Langelier's Seedling Queen Victoria Pear. Langelier.

Much resembles the *Glou Morceau*. Flesh melting, buttery, exceedingly rich and sugary. Season, January. If it should prove sufficiently distinct from the *Glou Morceau*, when grown under precisely the same circumstances, this sort must be considered highly deserving of cultivation.

Soldat Laboureur. (Esperen.) De Jonghe.

The *Soldat Laboureur* has been confused with the *Beurré d' Aremberg*. This, however, is quite different from the latter; but it is very like the *Beurré Diel*. Season, November and December. In point of flavour it was considered as good as the *Marie Louise*.

De Sorlus. (Van Mons.) De Jonghe.

Fruit middle-sized, of an oval form somewhat resembling that of the *St. Germain*. Skin pale yellow. Flesh rather gritty, sweet, not so good as the *Passe Colmar*. Season, November, December. Requires further trial.

Reine d' Hiver Pear. Langelier.

Fruit small, turbinate. Stalk slender, about half an inch in length. Eye open, rather deeply sunk in a rounded hollow. Skin covered with smooth russet, reddish next the

sun. Flesh yellowish-white, granular, moderately juicy, sweetish, yet somewhat astringent and by no means first-rate—in fact, not worthy of cultivation. Season, December.

Rousselet de Janvier. (Van Mons.) De Jonghe.

Fruit scarcely middle-sized, obovate. Skin rough and thick, for the most part russeted, brownish red next the sun. Flesh yellowish white, rather coarse, juicy but not rich. Season, December and January.

Van Mons Léon-le Clerc. Langelier.

From a standard.

Eye shallow, with the segments of the calyx reflexed on the sides of the small cavity. Skin brown, nearly covered with smooth cinnamon russet—more so than specimens grown in this country generally are. Flesh yellowish-white, melting, buttery and rich, but now (December) rather far gone. A very excellent Pear.

Triomphe de Jodoigne. (Bouvier.) De Jonghe.

Fruit large, resembling in form a well-grown Passe Colmar. Eye open, in a shallow depression. Skin yellowish, slightly russeted, and mottled with yellow and cinnamon. Flesh yellowish white, melting, sugary and delicious, with a vinous flavour. Season, November and December. It is considered equal to the Brown Beurré when that is obtained in perfection; and it is preferable to the Beurré Clairgeau.

Virgouleuse. Langelier.

Yellowish brown. Flesh more yellow than perhaps that of any other Pear. Melting and rich, with vinous flavour. Ripe in December. This is not a new variety, but the contrary. It is a shy bearer in this climate; but has been recommended for grafting on the Quince stock, and then graft other Pears upon the Virgouleuse, which do not succeed if immediately grafted on the Quince.

Wormsley Grange. (Knight.) Langelier.

Brownish yellow, nearly covered with russet near the eye. Flesh white, rather gritty, but tender, very sugary and rich, much better than it has proved in England of late years.

Zéphirin Grégoire. (Grégoire.) De Jonghe.

Fruit small, obovate, yellowish brown and somewhat russeted. Stalk yellow. Flesh melting, buttery, very rich and sugary. An excellent Pear, resembling the Winter Nelis. Ripe in November, but it is said to keep much longer in some cases.

PROCEEDINGS AT MEETINGS OF THE SOCIETY.

June 28th, 1853. (REGENT STREET.)

I.—ELECTIONS.

Sir T. Duckworth, Bart., M.P., Wear House, Exeter; J. Tollemache, Esq., M.P., Hellmingham Hall, Suffolk; W. F. Cook, Esq., Oaklands, East Tytherly, Stockbridge; G. U. Skinner, Esq., Chipperfield House, Kingslangly; A. Druce, Esq., Dulwich Common; W. R. Sandbach, Esq., Aighburth, Liverpool; C. D. Alexander, Esq., 34, Portman Square; H. N. Fisher, Esq., Twickenham; C. Holt, Esq., 93, Guildford Street; and Mrs. Lawson, Aldboro Manor, Boroughbridge, Yorkshire.

II.—AWARDS.

Knightian Medal:—

To Mr. Burns, Gardener to Lord Stanhope, F.H.S., at Chevening Park, for the following varieties of Kitchen Garden produce, viz.:—Early Frame Potatoes, Early Horn Carrots, Early Dutch Turnips, very fine Celeriac, Horse-Radish; Victoria, Giant, and Linnæus Rhubarb; Red Beet, Tripoli Onion; Early York, Vanack and Wellington Cabbages; Early Cauliflower, Mushrooms, large, and in the button state; Early Frame Peas, Sword Long-pod Beans, apparently a good variety; Fulmer's Early Dwarf, and Speckled Kidney Beans; Asparagus, Round Spinach, Jerusalem Kale, Celery, Shallots, White Spine Cucumber; Bath and White Cos, Drumhead and Union Lettuces; Normandy, Water, American, Curled and Golden Cress; White Mustard, Italian Corn Salad, Garden Sorrel, Spanish Onions, Red and White Orach, Curled and Giant Parsley; Salmon, and White and Red Turnip Radishes; Taragon, Burnet, Chervil, Sweet Basil, Knotted Marjoram, Summer Savory, Pot Marjoram, common and Lemon Thyme, common and variegated Sage, Fennel, Sweet Bay, Tansy, Chicory, Pennyroyal, and

Spearmint. These were all excellent of their kind and extremely well grown.

To Mr. Chapman, Gardener to J. B. Glegg, Esq., F.H.S., for beautiful specimens of Bellegarde Peaches and Violet Hative Nectarines.

Banksian Medal:—

To Mr. Smith, Gardener to Mrs. Reay, of Little Blake Hall, Wanstead, for a collection of Vegetables, consisting of Red and White Turnip and short-topped Radishes; White Spine and Victory of Bath Cucumbers; Early American, Globe, and Hague's Kidney Potatoes; Brown Cos and Victoria Cabbage Lettuces; Globe and Jerusalem Artichokes, the former very small; Early Mazagan Bean, Asparagus, Dwarf Dun French Beans, Curled Parsley, Early Horn Carrot, Globe Onion, Early Dutch Turnip, Early Kent Peas, West Ham Cabbage, Asiatic Cauliflower, Horse-Radish, Mustard and Cress, common and Lemon Thyme, Garden Sorrel, Mint, and Sage.

To Mr. Dodds, Gardener to Col. Baker, of Salisbury, for a Providence Pine-apple, weighing 9 lbs. 10 oz.

Certificate of Merit:—

To Messrs. Hurst and McMullen, of Leadenhall Street, for a bundle of Salt's Crimson Perfection Rhubarb, an excellent kind, red throughout the interior, as well as outside the stalks. It was stated to be of the same breed as Buck's Rhubarb (*Rheum undulatum*), a Russian kind, not so large as some sorts, nor so acid, and very attractive, on account of its fine dark-red colour.

To Mr. Keynes, F.H.S., Salisbury, for a Lilac Lobelia, which promised to be a good bedding plant.

To Messrs. Osborn, of Fulham, for *Lysimachia Leschenaulti*, a pretty species bearing compact heads of small round rosy flowers. This also looked as if it would be a good plant for bedding purposes.

III.—MISCELLANEOUS SUBJECTS OF EXHIBITION.

Mr. Spivey, Gardener to J. A. Houlton, Esq., of Hallingbury, Herts, sent a collection of vegetables comprising Potatoes, Peas,

Broad Beans, Early Mousetail Turnips, Early Horn Carrots, Cauliflowers, Atkins' Matchless Cabbage, Asparagus, Spinach, Mushrooms (large and small), Jerusalem and Globe Artichokes, Old and Spring Leeks, Spring and Autumn-sown Onions, Rhubarb, Horse-radish, Spivey's White Spine Cucumber, Brown Cos Lettuce, Red and White Turnip Radish, Chervil, Tarragon, Burnet, Balm, Peppermint, Spearmint and other Mints, Red and Green Sage, Parsley, Horehound, Wormwood, Lemon and Common Thyme, Borage, Winter Savory, Sorrel, and Rue.

Mr. Todman, Gardener to Mrs. Buckmaster, of Clapham Park, also furnished a collection of vegetables, consisting of Onions, Cauliflowers, Early Horn Carrots, Hunter's Prolific Cucumber, Barnes's Early and Early Oxford Cabbages, Brown and Wellington Cos Lettuce, Spinach, Asparagus, Shilling's Grotto, Sangster's No. 1, and early Danecroft New Rival Peas, and Potatoes.

Mr. Chapman, Gardener to J. B. Glegg, Esq., F.H.S., sent wonderfully fine Neapolitan Cabbage Lettuces from Cheshire, and a Providence Pine-apple, weighing 7 lbs. 13 oz.

The Hon. W. F. Strangways contributed Eucalyptus bark, from trees that had grown large enough in the open ground, at Abbotsbury, in Dorsetshire, to bear stripping: and wild Madder-roots (*Rubia peregrina*), which, not being very particular as to soil, he considered might possibly be grown with advantage on otherwise unproductive land.

A fumigator was exhibited by Mr. Geach: it is on the principle of Brown's, but the fire-box is fixed on the side, and the power which works the fans is wound up with a key, so that when charged, and placed inside a house, it will go on working without any attention whatever, until the house is filled with smoke, and it has run down. The advantage is, that the operation can be effected without there being any occasion for subjecting oneself to the (to most people) disagreeable fumes of Tobacco smoke.

IV. ARTICLES FROM THE SOCIETY'S GARDEN.

The new *Diplazis grandiflorus*, the sweet-scented *Philadelphus mexicanus*, an excellent plant for forcing; Barnes' variety of *Phenocoma proliferum*, a good dark sort; *Pelargonium lateripes*, a very showy white species; *Sedum Kamtchaticum*, a deep yellow kind, with good foliage; and the following new Annuals: *Silene*

pendula alba, a profuse flowerer, dwarf and very handsome ; *Cenia turbinata* (white), ditto *formosa* (yellow), these both promise to be very useful plants, producing when grown in tufts like Chamomile a very good effect, and continuing on in blossom until the plants have become so exhausted as to be unable to throw up more. The straw-coloured *Tropæolum Shuurmannianum* was also sent together with *Chryseis californica alba*, *Linaria macroura* (Vilmorin), a pretty species ; and *Nemophila aurita alba*.

Along with the above, came the following vegetables ; large Asiatic and Walcheren Cauliflowers ; Early Frame (Early Kent), Bishop's New Long-pod, and Nain très hâtif extra Peas ; Sutton's Cornish and Early Battersea, Vanack, or Cock's Cabbage ; Round Summer Spinach, Early Mazagan Bean, Red and White Orach ; Radis Rose demi-long, and the following Lettuces, Laitue Romaine blonde Maraîchère, Laitue Romaine verte Maraîchère, and Laitue Chou de Naples ; Victory of Bath Cucumber, Early Red Strap-leaf, and Early White Strap-leaf Turnips ; Rheum Emodi, *Sarracha viscosa* from Mexico, *Physalis Peruviana* and Oca.

Of these, Bishop's New Long-pod Pea is a valuable dwarf sort, the pods being much larger than those of any other of the very dwarf sorts ; Pois Nain très hâtif extra is an extraordinary bearer, and so dwarf that it may be sown in rows 15 inches apart ; the true Early Battersea, Vanack, or Cock's Cabbage is the best for a general crop. When the seed is saved true, and well grown, the leaf-stalks come out so closely above each other, that no interval of stem can be seen. The whole of the heart, even the ribs, boil very tender ; Laitue Romaine blonde Maraîchère is considered the best Summer Cos Lettuce, although some prefer the Laitue Romaine verte Maraîchère—both are excellent ; Laitue Chou de Naples Cabbages firm and very crisp ; the Victory of Bath Cucumber is a good bearing sort—on the whole, one of the very best ; the Early Red Strap-leaf and Early White Strap-leaf Turnips are excellent early kinds, seeds of which were received from M. Vilmorin, of Paris. The leaves are upright and narrow, jagged, however, to the base of the petiole, in general. Rheum Emodi is a Rhubarb not much cultivated ; it does not make its appearance above-ground till late, and consequently when it is not so much wanted. Its leaves are extremely large, and it was suggested that it might be usefully grown in gardens for wrappers for protecting fruit and vegetables when conveyed in baskets. It is the sort which furnishes the Rhubarb of the

hospitals in India, and is a very ornamental Autumn plant in plantations and other rough places.

V.—BOOKS PRESENTED.

The Athenæum for May. From the Editor.

Addresses delivered by J. O. Westwood, Esq., at the Anniversary Meetings of the Entomological Society, in 1852 and 1853. From the Author.

Correspondence relative to the discovery of Gold in Australia. From G. W. Earl, Esq.

July 9, 1853. (GARDEN EXHIBITION.)

Reported in Vol. VIII. *Proceedings*, p. 1.

July 26th, 1853. (REGENT STREET.)

I.—ELECTIONS.

John Baring, Esq., Oakwood, Chichester; H. F. Broadwood, Esq., 46, Bryanstone Square; Lieut.-Col. F. G. Harriott, Grove House, Twickenham; and W. Ricardo, Esq., Haling Grove, Croydon.

II.—AWARDS.

Knighthian Medal:—

To Mr. Burns, Gardener to Lord Stanhope, F.H.S., at Chevening, for a correctly-named and very fine collection of vegetables, consisting of Frame and Purple Kidney Potatoes, the latter a handsome sort not often seen; Early Horn Carrot, Horse Radish, Dutch and Stone Turnip, Old and Spring-sown Beet; Spanish, Tripoli, Globe, and Strasburg Onions; Vanack, Wellington, and Early York Cabbage; Sword Long-pod, and Windsor Beans, the former the hardier of the two; Shilling's Grotto, Champion of England, Mammoth Dwarf, Ne plus Ultra, and Auvergne Peas; Victoria, Linnæus, and Giant Rhubarb; scarlet runners, Fulmer's Dwarf Speckled Kidney Beans, Jerusalem Kale, Cabbage Sprouts, London Leek, Vegetable Marrow, Common Sorrel, Fennel, Spearmint, Summer and Winter Savory, Pot and Knotted Marjoram, Sweet Basil, Borage, Sweet Bay, Tarragon, Tansy, Pennyroyal, Giant and Curled Parsley, Round

Spinach, Red and Green Orach leaves, Cauliflowers, Large Mushrooms, Shallots, Union Cabbage, Drumhead, Bath Cos, Paris Cos, and Black-seeded Green Cos Lettuces; White Spine Cucumber; Salmon, White, and Red Turnip Radishes, Seymour's White and Red Celery, White Mustard, Italian Corn Salad; Water, Golden, and American Curled Cress; Chervil, Burnet, Lemon, and Common Thyme; and Variegated, and Common Sage.

Banksian Medal:—

To Mr. Smith, Gardener to Mrs. Reay of Little Blake Hall, Wanstead, for another Collection of Kitchen-garden produce, comprising Burbidge's Eclipse, Blue Seymetar, Auvergne, Green Mammoth, and Ne Plus Ultra Peas; Asiatic and Walcheren Cauliflowers; Taylor's Windsor and Early Mazarin Beans; Nonpareil and Early Dun French ditto; West Ham and Enfield Market Cabbages; Early Horn, White Dutch, and Long Red Carrots; Old and New Beet; Globe Artichokes; Early Dutch and Early Stone Turnips; Globe Onion; Ash-leaved Kidney, Jackson's New Ash-leaved Kidney, Hague's New Kidney or Lapstone, Early Shaw, Early Globe, and Early American Potatoes; Horse Radish; various Vegetable Marrows, Prickly Spinach, Curled Parsley, Seymour's Red Celery, Nasturtiums, Scotch Leeks, Victory of Bath and Sheridan's Cucumbers, Paris Cos (misnamed Snow's Cos) and Victoria Cabbage Lettuces; Early Salmon, Red, and White Turnip Radishes; Mustard and Cress, Chicory, Sorrel, small Onions, Chives, Mint, Balm, Fennel, Sweet Basil and Pot Marjoram, Red and Green Sage, Summer and Winter Savory, Lemon and Common Thyme, and Horehound. With reference to the Lapstone Potato, it is stated in *Loudon's Magazine* for February, 1843, p. 66, to be a seedling between the Early Ash-top and the Scotch red-nosed Kidney. "It was raised by a shoemaker in this neighbourhood (Yorkshire), and hence the name Lapstone." This shoemaker's name was Hague, and hence the name of Hague's Seedling, by which name it may be found in the seedsmen's catalogues. It is one of the finest varieties of Potato in cultivation. Jackson's New Ash-leaf is better than the common sort, the tubers being larger and much finer.

With regard to the foregoing exhibitions, it should be mentioned, that in addition to the Society's prizes, the two exhibitors (Mr. Burns and Mr. Smith) received, the first, 3*l.*, and the second 2*l.*, being sums offered by Dr. Lindley in the beginning of the season, to be awarded to those cultivators who might carry off the greatest number of prizes for vegetables at the meetings in May, June, and July.

To Mr. Fleming, Gardener to the Duke of Sutherland, F.H.S., at Trentham, for a Black Prince and Providence Pine-apple, the first weighing 5 $\frac{3}{4}$ lbs.

Certificate of Merit:—

To Messrs. Henderson, of Pine Apple Place, for six Plants of Burridge's *Salpiglossis coccinea*, a showy kind, but apparently not fixed in colour, the flowers being much paler this year than last.

To Messrs. Youell, of Great Yarmouth, for a box-full of unusually large and fine fruit of the Fastolf Raspberry.

To Mr. Myatt, of Deptford, for his Strawberry, called *Cinquefolia*, which, on being handed to the Chairman, was pronounced by him to be "a well-flavoured and very good variety."

To Mr. Draper, Gardener to the Bishop of Salisbury, for a beautifully-ripened and well-formed Queen Pine-apple, weighing 5 lbs. 2 oz.

To Mr. Jones, Gardener to Lady Charlotte Guest, Dowlais House, Glamorganshire, for two handsome Ripley Queen Pine-apples, weighing respectively 4 lbs. 14 oz. and 4 $\frac{1}{2}$ lbs.

To J. Luscombe, Esq., F.H.S., Combe Royal, Kingsbridge, Devon, for half-a-dozen Shaddocks. They were stated to have been produced by a tree growing against a south wall where it received no protection except that of a reed frame at night, or in very severe weather by day.

III.—MISCELLANEOUS SUBJECTS OF EXHIBITION.

Mr. Spivey, Gardener to J. A. Houblon, Esq., of Hallingbury, near Bishop's Stortford, contributed a collection of Vegetables: but they were not near so good as those sent from Chevening or Blake Hall.

Mr. Patterson, of Thame Park Gardens, Oxon, showed his Matchless Green Marrow Pea, a large fine-looking kind ; but, in this instance, too old to judge with any certainty of its quality.

A collection of Peas was furnished by Mr. Wrench, of London Bridge, but they arrived too late for competition. They consisted of Early Green Marrow, Dwarf Imperial, Flack's Pea, Banksian Marrow, Scymetar, Auvergne, Blue Prussian, Tall Sugar, the kind with eatable pods, the latter being destitute of the tough lining inside which other Peas have ; Burbidges' Eclipse, Early Surprise, and Ringwood Marrow. Concerning these, Mr. Wrench stated that the Auvergne is an admirable sort, and most prolific, and that the Banksian Marrow is thought very highly of : the seed of this sort originally came, it is said, from Sir Joseph Banks's garden.

Mr. Pince, of Exeter, furnished a *Hæmanthus* newly imported from the Zulu country ; it is nearly allied to *H. coarctatus* and *hyalocarpus*, but possibly distinct from either.

C. Leach, Esq., F.H.S., of Clapham Park, sent *Disa grandiflora* in flower ; the blossoms were not so finely coloured as those of Mr. Hanbury's *Disa*, shown at the last garden exhibition, but the plant in the present instance was better grown. It was stated to be three years old, and had all the appearance of being established and disposed to thrive.

Mr. Keynes, of Salisbury, sent a box of Picotees, and another of Carnations.

Mr. Ayres, of Brooklands Nursery, Blackheath, produced two Seedling Pelargoniums, accompanied by the following memorandum concerning them :—" I forward," he says, " a Seedling Pelargonium from *P. fulgidum* crossed with one of the dark Fancies. It will be perceived that it is intermediate in character, and partakes quite as much of the Cape species as of the Fancy variety. I fear it is a true mule, for it produced no pollen, and all attempts to fertilise it from other sources have so far proved abortive. If it could be seeded by a fine-formed Fancy of bright colour, I think, from its having the hardy constitution of *P. fulgidum*, it might give us a race of good bedding plants, desirable in habit and perpetual bloomers ; or, by its pollen, the *orange tint* might be worked into the Fancies. With it are some flowers of another Cape cross, viz., *P. formosissimum* of Sweet, with possibly the Fancy called Jenny Lind. It will be seen that the

white is very pure and the flower large, while the foliage bears a close resemblance to the Cape species. This seeds very freely, and from it I anticipate something good."

From Mr. Smith, Gardener to Mrs. Reay, came bunches of Oldaker's West's St. Peter's Grape, black, with a good bloom on them, but not ripe. The same exhibitor also sent a hybrid green-fleshed Melon.

From Mr. Grant, Gardener to G. H. Simms, Esq., came Victory of Bath green-fleshed Melon, which, on being cut up, proved to be not *very* good.

Mr. Fleming produced a dish of Brown Turkey Figs, from Trentham; they were stated to have been grown in a house of peculiar construction, which is fully described and figured in the *Gardeners' Chronicle* for 1852, p. 372. The house was finished in April of that year, and there are now plenty of ripe Figs in it, as well as a good crop of Grapes (swelling), and on the front trellis a few nice Apricots. Mr. Fleming stated that these houses answer better than any he has, and that similar ones are being erected by many noblemen and gentlemen throughout the country.

IV.—ARTICLES FROM THE SOCIETY'S GARDEN.

The white variety of *Platycodon chinensis*; *Myosotis azorica*, a brilliant deep-blue flowered plant, that ought to be better known than it is; various *Achimenes*, among which was the pure white *A. Margarettae*; *Oxalis rosea*, a very showy kind for conservatory shelves, producing great masses of round rosy flowers. *Calceolaria chelidonioides*, a yellow sort, which, having no open mouth in the flowers, will be found to be useful for bedding in wet seasons; and the following new annuals, viz., *Schizanthus violaceus*, the white *Eschscholtzia*, the yellow *Hymenoxys californica*; a white variety of *Campanula pentagonia*, the orange-flowered *Cacalia sonchifolia*, *Podolepis chrysantha*, *Venidium calendulaceum* and *eximium*, the white variety of *Nolana grandiflora*, *Cenia turbinata*, and *C. t. formosa*; *Centranthus macrosiphon*, and its pale variety called *rosea*, both handsome Valerian-worts; *Monolopia californica*, and *Collinsia bartsiaefolia*.

The orchard department contributed the following vegetables, viz.:—Knight's Tall Blue and tall White Marrow, Dickson's Early Favourite, Fairbeard's Champion of England and Blue

Prussian Peas ; Early Mazagan, Broad Windsor, and Marshall's Prolific Beans ; Scarlet Runner, Sutton's Cornish, and Cock's or Vanack Cabbage ; Round Summer Spinach, White and Red Orach ; Navet Blanc plat hâtif ; Early White and Red Strap-leaf Turnips ; Chou rave blanc plat hâtif de Vienne, Vegetable Marrows, Laitue Alphonse blonde à graine noire, Laitue Alphonse blonde à graine blanche, Laitue Pomme d'Été, ou d'Automne, and Bath Cos Lettuce ; and of fruits, Seymour's Golden Perfection, and Cassaba Melons ; Rivers's New Large-fruited Double-bearing-Raspberry, Wilmot's New White and Red Currants ; and six sorts of the old, small, sweet, early Gooseberries, viz., Oval Red, Sulphur, Irish White Raspberry, Early Green Hairy, Early White, and Small Dark Rough Red.

It may be mentioned that, among all the new varieties of Peas, none have been found to equal Knight's Marrow, in point of sugary qualities. Dickson's Early Favourite is a good variety, early and prolific ; and the Blue Prussian, as a summer Pea, still maintains its place. Sutton's Cornish Cabbage is a good kind, the ribs of the leaves being nearly as tender, when cooked, as those of the Portuguese Couve Tronchuda. The Early White Strap-leaf Turnip is a new sort, which is likely to prove excellent. The Laitue Alphonse blonde à graines noires and à graines blanches, are sorts of Cos Lettuce which grow to a large size, but they do not heart well, and require tying in order to blanch them ; they have, on the other hand, the very great merit of running to seed more unwillingly than any other Lettuces. Rivers's new large-fruited double-bearing Raspberry is an excellent bearer, both early and late. Wilmot's new white Currant is a good variety, easily distinguished by the leaf, which is more cut than that of any other white Currant.

V.—BOOKS PRESENTED.

- Journal of the Royal Agricultural Society of England, Vol. XIV. Part 1. From the Society.
 Journal of the Royal Asiatic Society, Vol. XV. Part 1. From the Society.
 Transactions of the Linnean Society, Vol. XXI. Part 2. From the Society.

October 18th, 1853. (REGENT STREET.)

I.—AWARDS.

Knightian Medal:—

To Messrs. Veitch, for *Impatiens Jerdoniæ*, a new Greenhouse herbaceous plant of very great beauty. It forms a tuft of fleshy or tuberous stems, about a foot high, of a deep purple colour, concealed by numerous narrow, deep-green leaves, from among the uppermost of which appear great numbers of flowers in general form like those of any other Balsam, but of a brilliant brick-red, relieved by yellow and green. The red belongs to a large, bag-shaped, curved pouch, which hangs down in front of the flower-stalk; the yellow and green, confined to the small sepals and petals, form a helmet-shaped body, which seems to terminate the pouch. The figure in the *Botanical Magazine* was taken from a very ill-coloured specimen. It will, no doubt, propagate easily by cuttings, if not by seed, and cannot fail to be a universal favourite. Mr. M'Ivor sent the tuberous stems from the Neilgherry garden, at Ootacamund, to the Royal Botanic Gardens, Kew, where it first flowered in June, 1852.

Banksian Medal:—

To Mr. Ingram, Gardener to Her Majesty at Frogmore, for a collection of Pears, consisting of the following kinds, viz. :—Beurré Bosc, Van Mons Léon le Clerc, Marie Louise, Louise Bonne of Jersey, and Autumn and Gansel's Bergamot. These were all fair-sized specimens, quite ripe, and correctly named.

To Mr. Lewis Solomon, of Covent Garden, for an exhibition of Foreign produce in the shape of large specimens of the following sorts of Pears, viz. —Crassane, Beurré Magnifique, Duchesse, Le Curé, and Belle Angevine.

To Mr. Jones, Gardener to Lady Charlotte Guest, of Dowlais House, Glamorganshire, for three Pine-apples, weighing respectively 4 lbs. 10 oz., 4 lbs. 4 oz., and 4 lbs. 2 oz.

To Mr. Butcher, of Stratford-on-Avon, for three very fine bunches of Barbarossa Grapes, with berries large and black, and covered with a fine bloom.

Certificate of Merit:—

To Mr. Braid, Gardener to H. Perkins, Esq., of Hanworth Park, for a collection of Pears, consisting of Duchesse d'Angoulême, Marie Louise, Napoléon, Brown Beurré, Belle et Bonne, and Hacon's Incomparable.

To Mr. Evershed, Market Gardener, Godalming, for a dish of British Queen and Prolific Peas, young and tender, and quite free from mildew. The pods, however, were a little discoloured, owing, doubtless, to the coldness and wetness of the season.

To Mr. Higgs, Gardener to Mrs. Barchard, of Putney Heath, for a Moscow Queen Pine-apple, weighing 3 lbs. 9 oz.

To Mr. Busby, Gardener to S. Crawley, Esq., F.H.S., Stockwood Park, Luton, for a seedling White Grape, said to have been raised between a Black Hamburgh and the Dutch Sweetwater, the latter being the male parent. The berries are large, and oval in shape, and were reported to be delicious in flavour. It certainly looked as if it would prove an acquisition.

To Mr. Robertson, Gardener to Miss Thackeray, the Priory, Lewisham, for eight Seville Oranges, well ripened, and altogether first-rate examples of good growth.

To R. Crawshay, Esq., for specimens of White Spanish Onions, grown at Crosby Hall, in Surrey. They were quite as large as the average of imported ones to be seen in the shops, but not so well ripened. "I measured fairly," says Mr. Crawshay, "the land which produced them, and besides what my large family have consumed during the summer from the same beds, I had at the rate of upwards of 20 tons weight per acre. The land was thoroughly well prepared for them; they were drilled and well attended to all the summer."

To Messrs. Veitch, for *Fuchsia Dominiana*, a hybrid between *F. spectabilis* and *F. serratifolia*. It is certainly quite as handsome as *F. spectabilis*, which it very much resembles, and it appears to be far more cultivable.

To Messrs. Standish and Noble, for a Peruvian *Calceolaria*, named *Hyssopifolia*, a kind with small, clear yellow flowers and good foliage. It was stated to be a free bloomer, and that it would probably turn out to be a good bedding plant.

To Mr. Summerfield, Gardener to J. S. Venn, Esq., of Highbury, for a well-flowered plant of *Dendrobium Chrysanthum*.

II.—MISCELLANEOUS SUBJECTS OF EXHIBITION.

Mr. Rivers, of Sawbridgeworth, sent a much-varied and extremely interesting collection of Pears, many of them new and others good specimens of well-known kinds, chiefly from pyramidal trees on Quince stocks; but a few from trees under glass in his orchard-houses. Among the latter were Brown Beurré large and fine, and so different in appearance from fruit of the same kind ripened out of doors as to be easily mistaken for another variety. Of novelties those which seemed the most remarkable were Nouveau Poiteau, Josephine de Malines, Laure de Glymes, and Triomphe de Jodoigne. The Laure de Glymes is a medium-sized very attractive Pear, with a warm colour something like the Beurré de Capiaumont; the Triomphe de Jodoigne is a large green Pear, said to be of first-rate quality.

Mr. Higgs furnished a dish of Barchard's Seedling Apple, a medium-sized, good-looking fruit, which was pronounced to be well-flavoured.

Mr. Powell, Gardener to C. G. Thornton, Esq., F.H.S., also furnished a dish of what has been called Marden Hill Seedling, a Hertfordshire Apple reported to have much merit.

Some good specimens of Red Astrachan Apples were contributed by Mr. Busby, the Gardener at Stockwood Park, Luton.

Mr. Fry, Gardener to Mrs. Dent, of Manor House, Lee, Kent, sent a dish of Coe's Golden Drop Plums in good condition.

From Mr. Fraser, of Luton Hoo Park, came three bunches of the Black Morocco Grape, a coarse kind not generally sought for.

Mr. Spary, of the Queen's Graperies, Brighton, produced well-coloured Black Hamburgh Grapes ripened without the aid of fire heat.

Messrs. Henderson, of Pine Apple Place, furnished the yellow *Begonia xanthina* in blossom; but it was a small specimen, and poorly flowered, not at all like the handsome figure of this really fine plant recently given in the *Botanical Magazine*.

From the Tooting Nursery came a collection of Orchids; but these, as well as a yellow-flowered, white-striped leaved *Aphelandra*, from M. Van Houtte, of Ghent, but shown by the Messrs.

Rollisson, arrived too late to receive any award. Among the Orchids were *Oncidium varicosum*, a charming species with a large round yellow lip; the Blue Vanda, a very ornamental plant at this season; *Sophronitis grandiflora*, suffering in colour for want of bright sunlight, but nevertheless extremely gay; *Miltonia Moreliana*, which is only a purple variety of *M. grandiflora*; the pretty *Cattleya Pineli*, *Lælia Perrini*, and one or two other species.

Various Garden Labels were furnished by Messrs. Branston & Co., Red Lion Square, Bloomsbury. They were made of galvanised cast-iron, very neat in appearance, the name, &c., being printed in large handsome letters, on a plate of glass let into the head of the label, and hermetically sealed, so as to preserve the name from the action of the weather. They varied from 1s. 2d. to 1s. 6d. each. One, a large and handsome label, costing 3s. 6d., was made of strong wrought iron, with the head riveted on, so that it could not possibly break, which cast-iron ones are apt to do when hit sharply with a roller, or other heavy implement.

III.—ARTICLES FROM THE SOCIETY'S GARDEN.

The early flowering Pomponé *Chrysanthemum* called Hendersoni, a variety of *Thunbergia alata* named Freyeri, *Perilla japonica*, a deep purplish brown-leaved small-flowered annual, with a strong and by no means disagreeable perfume; flowers of *Cestrum aurantiacum*, which blooms so freely several times a year in the larger conservatory, and cut flowers of the following hardy Annuals (the only collection produced), viz.:—the Camomile-like *Cenia turbinata*, and *t. formosa*; *Venidium calendulaceum*, *Dianthus Gardneri*, the white-flowered *Gypsophila Steveni* (which has been extremely gay all the season), *Gilia tricolor*, *Viscaria oculata*, *Eucharidium grandiflorum*, *Erysimum Perofskianum*, three kinds of *Coreopsis*, *Calliopsis Drummondii*, seven varieties of *Lupine*, *Lobelia gracilis*, *Gnaphalium bracteatum*, *Campanula vineæflora*, *Senecio albus*, *Schizanthus peduncularis*, the Bladder Ketrum, *Tagetes miniata striata*, *Limnanthes alba*, the ugly *Tropæolum Shuurmanianum*, *canariense*, and *Lobbianum*; *Godetia rubicunda* and *lepidula*, *Mignonette*, Sweet Alyssum, Brompton Stock, *Impatiens glanduligera*, *Cosmos bipinnatus atropurpureus*, Chinese Pink, and Pot Marigold. These were all flowering in great perfection until the frost of the 3rd inst. arrived, which very much impaired their beauty, and altogether killed more tender kinds.

The garden also furnished the following Pears, viz., Duchesse d'Angoulême, Beurré Diel, Marie Louise, Gansel's Bergamot, Seckel, and King Edward's Pear, so named, it is said, because it was first planted by a King Edward, near Winchester. It is a good Pear and grows very large in favourable seasons.

Accompanying these were, likewise, Aubergine Violet, Large Spanish Capsicum, a mild kind, grown and ripened in Ewing's glass wall; *Saracha viscosa*, a South American plant, bearing bright red conical fruit, about as large as a Cherry, but of little value; *Physalis Peruviana*; Pomeranian and Winnigstadt Cabbages, and the Early Ulm Savoy, an extremely useful sort, which does best in soil not too rich, and which may be planted at 1 foot apart. It may not be generally known that if the head be cut close to the lower leaves, small heads will again push, like Brussels Sprouts, and almost as delicious.

IV.—BOOKS PRESENTED.

The Athenæum for June, July, August, and September. From the Editor.
Transactions of the Horticultural Society of Berlin, Vol. XXI. Parts 3 and 4. From the Society.
Transactions of the American Philosophical Society, Vol. X., Part 2; and Proceedings of the same, Vol. V. Parts 47 and 48. From the Society.
Smithsonian Contributions to Knowledge, Vol. V. Sixth Annual Report of the Board of Requests; Reports of Scientific Investigations in relation to Sugar and Hydrometers. From the Smithsonian Institution.
Literary Gazette for June, July, August, and September. From the Publishers.
The Quarterly Journal of the Geological Society, No. 35. From the Society.
Journal of the Society of Arts, No. 1 to 47 inclusive. From the Society.

November 1, 1853. (REGENT STREET.)

I.—ELECTIONS.

Joseph D. Rigby, Esq., Priory Lodge, Kew; William Philips, Esq., Montacute House, Yeovil; Walter C. Fleming, Esq., Spring Grove, Bewdley; Henry Vaughan, Esq., 28, Cumberland Terrace; Mr. Martin Hope Sutton, Nurseryman, Reading; and Mons. André Le Roy, Angers.

I.—AWARDS.

Knightian Medal :—

To Mr. Ingram, Gardener to Her Majesty, at Frogmore, for beautiful examples of Dessert and Kitchen Apples, and for dishes of Coe's Golden Drop, and Coe's Fine Late Red Plums. The latter were plump and good, and the Apples

were particularly well coloured, considering the sunless season we have had. They were stated to have been ripened on the semicircular wire trellises with which the borders along the sides of the walks at Frogmore are furnished, and which have the advantage of exposing the fruit well to the action of the sun and air.

Banksian Medal :—

To M. P. A. Bréfort, Nurseryman, Rue de Maquétra, Boulogne-sur-mer, for a collection of Pears and Apples. It consisted of 160 fruits of old and new sorts, including a considerable number which were synonymous. The following were previously known sorts: Duchesse d'Angoulême, St. Lezin, Bonne Louise, not the Louise Bonne (of Jersey), Beurré Rance, Chaumontel, Bon Chrétien d'Hiver, Bezi d'Héri, Poire de Chypre, Bon Chrétien Ture, Catillac, Bellissime d'Hiver, Dearborn's Seedling, Napoléon, Muscat d'Allemagne, Colmar Van Mons, Mansuite, Messire Jean, Belle Audibert, Gilgil, Virgouleuse, Bergamotte Panaché or Bergamot Suisse, Jaminette or Colmar Jaminette, Doyenné Sieulle, Urbaniste, St. Germain, Martin Sec, Royal d'Hiver, Sucre Vert, Bergamotte de Pâques, Duchesse de Mars, Culotte du Suisse, Amadot, Beurré Duval, Calebasse or Beurré Bosc, Poire Curé or Vicar of Winkfield, Crassane, Calebasse Grosse, Angélique de Bourdeaux, Delices d'Hardenpont, Leon le Clerc, Bergamotte Sylvange, Fortunée de Parmentier.—Sorts new or but little known in this country: Beurré de Racquinghen, Colmar d'Hiver, Beurré d'Austerlitz, Lepsom, Vingt Mars, Frédéric de Wurtemberg, Van Assche, Vétérans d'Hiver, Catinka, Passe Meuris, Poire d'Angers, Tarvernier de Boulogne, St. Isidore, Beurré Quetelet, Doyenné du Comice, Delia Alost, Beurré Sterkmann, Jules Bréfort, Nigelle, Bergamot Sageret, Triomphe de Jodoigne, Comtess de Fremoy, Beurré St. Helier, Louis Philippe Vauquelin, Parmanie, Poire Capucin, St. Michael Archange, Ananas, Louise de Boulogne, Colmar Bonnet, St. Jean Baptiste, Oken d'Hiver, Faux Sprew, Certeau Gris, Cruickshanks, Philippe de France, Eliza d'Heyst, Colmar d'Automne, Doyenné Crotté, Josephine, No. 1010 Van Mons, Cambronne, Tarquin des Pyrénées, Calebasse de Nerckman, Beurré Clergeau, Tombe de l'Amateur, Beurré Moiret,

Beurré de Zurich, Doyenné d'Alençon, Beurré Derouineau, Willermot Bivort, St. Germain Baud, Poire de Vétérans, Calebasse Nerckman, Souvenir d'Hiver.—The following were found to be synonymous with sorts known in the Society's Garden :

Belle parfumée } . . .	<i>Syn.</i>	Vicar of Winkfield.
Belle de Berry } . . .		
Charles Dix	"	Napoléon.
St. George	"	"
Soldat Laboureur } . . .	"	Beurré d'Aremberg.
Orpheline d'Enghien } . . .		
Beurré d'Hardenpont . . .	"	Glout Morceau.
Louise Bonne d'Avranches . . .	"	Louise Bonne (of Jersey).
Beurré Aurore	"	Beurré de Capiaumont.
Beurré d'Aremberg	"	Glout Morceau.
Bon Chrétien de Vernois . . .	"	Beurré Diel.
Beurré Royal	"	"
Poire Melon	"	"
Doyenné Doré	"	Doyenné Blanc.
St. Michel	"	"
Doyenné Picté	"	"
Beurré Blanc d'Automne . . .	"	"
Belle de Bruxelles	"	Flemish Beauty.
Fondante de Bois	"	"
Belle de Flandres	"	"
Beurré Spence	"	"
Beurré Gris	"	Brown Beurré.
Marie Louise Delcourt	"	Marie Louise.
Beurré Gris	"	Brown Beurré.
General Oudinot	"	Winter Nelis.
Dumilly	"	"
Belle Angevine	"	Uvedale's St. Germain.
Grosse Romaine	"	Catillac.
Bergamotte de Pentecôte . . .	"	Easter Beurré.
Bon Gustave	"	"
Calebasse Tougard	"	Calebasse Bosc.

Passe Colmar de Louvain	{ much re- sembled }	Passe Colmar.
Doyenné Boussoch	"	Doyenné Gris.
Double Mansuite	"	Mansuite.
Beurré d'Espagne	"	Passe Colmar.
Colmar Nelis	"	Winter Nelis.
Bavais	"	"
Poire de Seigneur	"	"
Cuisse Dame d'Automne . . .	"	Common Calebasse.
St. Quentin	"	Glout Morceau.
Princesse Marianne	"	Princesse d'Orange.
De Wael	"	Burgermeester.
Passe Meuris	"	Beurré Rance.
Voix à Prêtre	"	Uvedale's St. Germain.
Josephine	"	Aston Town.

The Ne Plus Meuris was incorrect; it appeared to be the Urbaniste. The Beurré Bronzée was different from the Bergamot-shaped, dark reddish-brown Pear received under that name from Van Mons. Double Fleur resembled the Présent Royal de Naples, a baking Pear allied to the Black Pear of Worcester. The Belle de Jersey has generally proved the same as the Uvedale's St. Germain, but the one in the above collection was different. The fruit exhibited under the name of Belle Angevine, another synonym of the Uvedale's St. Germain, weighed 1 kilogramme 200 grammes, or about 2 lbs. 6½ oz. This sort has been grown in England to the weight of 3 lb. 3 oz. The Doyenné Boussoch resembled a large Doyenné Gris; but in many collections it is identical with Double Philippe. Among the new sorts, the Beurré Clergeau is said to be excellent; but the specimen was spoiled in consequence of having been bruised by carriage. It was large, broad at the base, a little flattened at the eye, tapering regularly towards the stalk, at the insertion of which it is slightly truncated. Another sort, the Doyenné Crotté, is a middle-sized roundish fruit, of excellent quality, as was ascertained from a fruit of it having ripened near London in the present season.

The following Apples were also exhibited by M. Bréfort:—Rambourg Tardif, Calville de Luxemburg, Bellefille Normande, Belle Josephine, Reinette Blanche d'Espagne, Bellefleur, Impériale, Reinette du Canada, Calville Rouge d'Hiver, Reinette de Canterbury. Reine des Reinettes was like a large King of the Pippins; Pomme d'Eve like Alfriston; Rambourg Blanc resembled Alexander, and Rambourg Rayé the Beauty of Kent; Court-pendu appeared to be the Golden Reinette; and Reinette Rose was the Court-pendu Plat.

To Mr. Dods, Gardener to Sir J. Cathcart, Bart., of Cooper's Hill, Englefield Green, for a dish of White Alpine Strawberries.

To Mr. Blackler, Gardener to W. Gore Langton, Esq., of Newton Park, near Bath, for two finely-grown Queen Pine-apples, one weighing 5 lbs. 2 oz., and the other 5 lbs.

Certificate of Merit:—

To Mr. Whiting, Gardener to H. T. Hope, Esq., F.H.S., of the Deepdene, near Dorking, for three beautifully ripened bunches of Black St. Peter's Grapes.

To Mr. Power, Gardener to Sir Charles Morgan, Bart., Tredegar Park, Newport, Monmouth, for a Queen Pine-apple, weighing 5 lbs. 5 oz.

III.—MISCELLANEOUS SUBJECTS OF EXHIBITION.

Mr. Chapman, Gardener at Exton Park, Oakham, showed the following kinds of Pears, viz., St. Germain, Autumn Colmar, Beurré Diel, Brown Beurré, Marie Louise, and Seckel.

From the Deepdene, Mr. Whiting sent large well-coloured Fruit of Coe's Fine Late Red Plum, a valuable variety at this season of the year, and certainly deserving more extensive cultivation than it has hitherto received. The same grower also furnished two bunches of the Calabrian Raisin Grape, a late keeping white sort, which, when fully ripe (which those exhibited were not), is very well-flavoured.

From Messrs. Veitch came two sorts of Quinces that had been introduced into this country among other fruits from Syria by the late Mr. Barker. One named Monster Quince resembled the Portugal a good deal, and the other, which was named "Aukshe Ker," looked something like the large Pear-shaped Quince. They were both fine-looking sorts, and were reported to be excellent and very highly perfumed. "The fruit," wrote Messrs. Veitch, "is said to be eaten in Syria as dessert. The two examples of No. 1, and one of No. 2, are from standards in the open ground; the other fruit of No. 2, is from a plant in a pot in an Orchard House. They appear far more vigorous in their growth than the old Quince. We have them as standards with fine clean straight stems 5 feet high, and we have no doubt that they will prove valuable stocks for pears."

Mr. Churcher, Gardener to J. Guilton, Esq., of Little Park, Wickham, Hants, exhibited a Queen Pine-apple, weighing 4 lbs. 12 oz.; it was stated to have been ripened without the aid of fire heat.

From Messrs. Chandler, of Vauxhall, came the following sorts of Chrysanthemums, viz.:—Argentine, Attila, Piquillo, Solfaterre, Modèle, Renoncule, Sacramento, Hendersoni, Surprise, and Le Nain Bêché. These, as will doubtless be perceived by their names, were all small-flowered sorts, called Pompones.

Of Orchids, Messrs. Maule and Sons, of Bristol, sent a charming plant of a very deep-coloured variety of the Blue Vanda (*V. cærulea*), but unfortunately it arrived too late to receive any award.

Two flowering spikes of *Gynerium argenteum*, were furnished by R. Hutton, Esq., F.H.S., of Putney Park, where this noble plant has flowered magnificently. It forms a large tussock of long glaucous, hard-skinned, drooping, serrated leaves, from among which spring tall flower-spikes, surmounted by great loose silvery panicles of inflorescence, which are exceedingly ornamental. The only thing to be regretted in connection with this fine plant is the difficulty of increasing it; for what offsets can be got from it are so hard that they refuse to strike root in the ordinary way; and, on the other hand, our summers are too short and sunless for it to ripen seeds. Such being the case, nothing can be done in the way of distributing it till ripe seeds shall have been obtained from the country where it grows wild, and therefore the Society has taken steps to import a quantity. It may be mentioned, however, that persons in correspondence with Buenos Ayres may easily secure seeds for themselves from there, where it is well known under the name of the Pampas Grass. It is perfectly hardy, and will grow almost anywhere, a plant of it in the Society's garden having been flooded with water nearly the whole of last winter, without apparently sustaining the slightest injury.

IV.—ARTICLES FROM THE SOCIETY'S GARDEN.

Strelitzia Reginae, *Begonia fuchsioides*, *Gesnera Herberti*, which did not appear to be different from *G. zebrina*; two Cape Heaths, *Maxillaria picta*, *Cuphea platycentra*, *Achimenes coccinea*, the yellow early-flowering *Chrysanthemum Hendersoni*, and another very dwarf *Pompona*, received without a name, from M. Van Houtte, of Ghent.

Among fruits were examples of *Beurré Diel*, *Figue de Naples*, *Brown Beurré*, and *Pomme Poire* Pears.

Vegetables consisted of *Chou de Milan des Vertus*, and *Chou de Milan très hâtif frisé de Würsing*, both excellent Savoy, the latter very large, the other medium sized; and of *Celery*, Cole's superb *Crystal White*, a good variety; *Celeri Gros Violet de Tours*, and *Sutton's superb Pink*, both apparently the same thing; at least, no person could tell the difference between Sutton's and the other, which is an excellent red *Celery* the Society has been in the habit of distributing for many years.

V.—BOOKS PRESENTED.

Transactions of the Royal Society for 1851 and 1852, and Proceedings of ditto, Vol. VI., No. 91 to No. 98 inclusive, from the Society.

Dec. 6th, 1853. (REGENT STREET.)

I.—AWARDS.

Knightian Medal :—

To Mr. Robinson, gardener to J. Simpson, Esq., of Thames Bank, Pimlico, for a collection of Pomponne Chrysanthemums, consisting of the following kinds, viz. :—Mignonette, brownish yellow; Daphne, purple; Nelly, white with a yellow centre; La Gitana, blush white; Atropos, brownish red; and Drine Drine, yellow. These were very healthy dwarf plants, and covered with flowers.

Banksian Medal :—

To Mr. Gifkins, Gardener to P. Johnson, Esq., of Church-street, Stoke Newington, for a group of the following varieties of large flowered Chrysanthemums, viz. :—Phidias, General Negrier, Christine, Pilot, Annie Salter, and Madame Camerson. These were all very large plants, measuring from 4 to 5 feet in height, and about as much in diameter.

To Mr. Snow, Gardener to Earl de Grey, West Park, Bedfordshire, for a collection of Pears, consisting of Beurré Diel, Chaumontel, Glout Morceau, Passe Colmar, Van Mons León le Clerc, and Napoleon. These were quite free from spot or blemish, and were altogether beautiful fruit of their respective kinds.

To J. Abell, Esq., of Limerick, for the following Pears, which had borne the severity of the last spring in that part of Ireland, viz. :—Après Belle de Noel, and Elise de Heyst, extremely well coloured, and both apparently the same sort; Poire d'Avril; Triomphe de Jodoigne, a large fine looking fruit; Beurré Rance; Beurré Diel, from a N. West, and the same variety from a N. East wall; Easter Beurré; Glout Morceau; Vicar of Winkfield; Hacon's Incomparable; Spring Beurré; and Ne Plus Meuris. Mr. Abell also sent examples of French Crab or Easter Pippin Apples, grown in 1852, and likely to keep until 1854; and 12 large Apples of the sort sometimes called "Tankards," but more commonly Catshead.

To Mr. Lewis Solomon, of Covent Garden Market, for the following examples of Foreign produce, viz. :—Chaumontel,

Glout Morceau, St. Germain, Easter Beurré, Winter Nelis, and Beurré Diel Pears, and White Calville and Reinette du Canada Apples; the latter were very superior to fruit of the same kinds grown in England, more especially as regards fine colour. They were also very large in size, The Pears were not so remarkable either for size or colour.

To F. Nash, Esq., of Bishops' Stortford, for a basketful of Grapes, consisting of Cannon Hall Muscat, Muscat of Alexandria, and Black Hamburg. These were large, both in berry and bunch, and quite equal to Mr. Nash's produce of former years.

To Messrs. Jackson, of Kingston, Surrey, for a group of Orchids; but more especially for plants of *Barkeria Skinneri*, *Cymbidium giganteum*, and *Oncidium Barkeri*.

Certificate of Merit:—

To Messrs. Standish and Noble, for a new half shrubby Gentian which, owing to the sunless state of the weather, unfortunately did not open well. By means of placing it before a bright fire, however, sufficient blooms were forced to expand to show how pretty it is. The flowers are light-coloured and spotted inside the base of the bell, while towards the top they exhibit a beautiful blue. Messrs. Standish say "it is quite hardy, having stood in the open border unprotected during the winter of 1852. In September last it showed signs of flowering, when it was taken up and placed in heat for the purpose of bringing it at once into bloom. About a month ago it expanded its first flower; the blossoms are only open in the day; at night they are closed. But they are of great duration; for the first flower is still in perfection, opening every day."

To Mr. Spary, of Brighton, for *Chrysanthemum Queen of Gipsies*, sent with a view to exhibit a peculiar mode of training. Mr. Spary stated that the plant was struck in March last, in a 3-inch pot, and had been kept in a cold frame till the end of April, when it was shifted into a 6-inch pot, pinching the top off and exposing it to the open air. In June it was shifted into an 8-inch pot, when training was commenced by placing a horizontal wire-trellis on the pot, so as to project about six inches beyond the rim, dividing the

shoots, and leading the longest to the outside, keeping the next lengths to fill in between, and the shortest for the middle. These were tied as they progressed every week, until July. Then each of the shoots was topped, and as soon as the plant began to break, it was again shifted into a 9-inch pot. When the laterals were long enough, they were then regulated and tied, so as to fill and form the plant, until September, when the centre shoots were allowed to turn up, keeping the outside ones tied down a fortnight longer, to make them shorter, so as to make the plant assume the form of a cone. When it was set for bloom, it was again shifted into a larger pot, to strengthen the flowers, and prolong its growth. The plant was then removed to the greenhouse to bloom. The Pomponé varieties are admirably calculated for this style of growth, but they require autumn-struck plants to carry the plan out to perfection. Plants managed in this way are dwarf and compact, and very suitable for front shelves or table stands in conservatories or greenhouses.

To Mr. Ingram, gardener to Her Majesty at Frogmore, for a collection of Pears consisting of Glout Morceau, Chaumontel, Beurré Diel, Vicar of Winkfield, Marie Louise, and Knight's Monarch. These were all from a west wall, except the Chaumontel and Beurré Diel, which were off the semicircular wire trellises which span the borders like an arch by the sides of the principal walks at Frogmore, and which had in consequence acquired a rich cinnamon brown skin.

To M. Langelier, of St. Helier, Jersey, for a large collection of Pears, which were, generally, poor specimens, and much injured by travelling, but which were useful, inasmuch as they served to show to what kinds certain names have been given in Jersey. The following among them were correct, as known in the Society's collection, viz.:—Easter Beurré; Catillac; Dowler's Seedling; Napoléon; Knight d' Hiver; León le Clerc, a stewing pear, not the Van Mons León le Clerc; Poire Sabine, Poire d' Austrassie, Jaminette; Fortunée Belgé, or Fortunée de Parmentier; Sarazin; Belle de Jersey, Uvedale's St. Germain; Wormsley Grange; Downton; Crassane; Merveille d' Hiver; Hacon's Incomparable; Achan d' Hiver (one of the winter Achans); Bezi Voet; Bolwiller; Duchesse d' Angoulême; Belle Audibert;

Bezi d' Heri; and King Edward's. The following were new, or but little known in this country: Bergamotte de Parthenay, rather large, Bergamotte shaped, with an open deep eye, russeted; Philip, medium-sized, obovate, tapering to the stalk, which is very long; Beurré gris d'Hiver, shape of Brown Beurré, colour, dark brown russet; Doyenné Marbré, roundish obovate, not unlike a large Winter Nelis, said to be rich: one of the fruits was obscure by being streaked with red; Suzette de Bavay, middle-sized, turbinate, greenish; Beurré d'Lambert, middle-sized, pyriform, thickly covered with cinnamon russet; Blanc Perné, middle-sized, roundish obovate; Beurré Chien, rather large, irregular shaped, greenish; Mansuette d'Hiver, middle-sized, pyriform, skin smooth, yellow; Duc de Bourdeaux, middle-sized, oblong-obovate, yellow dotted with brown, and tinged with bright red next the sun; Doyenné des Chasseurs, middle-sized, onion shaped, greenish brown; Beurré Duhamé (said to be a first-rate fruit), middle-sized, obovate, russeted; Belle de Brissac, middle-sized, obovate; Bezi de Montgeron, size, shape, and somewhat the appearance of the Swan's Egg; De Grosellier, middle-sized, pyramidal with a long straight stalk, colour greenish-brown; Colmar Nelis, form of Passe Colmar; Herefordshire Seedling, has the appearance of Winter Nelis; Icône, small and round with a long stalk; Marjol, middle-sized, obovate, with an open eye; Reine d'Hiver, small, roundish-obovate, deep red next the sun; Grand Mogul, middle-sized, pyriform, smooth, yellow; Mansuette, different from that figured in Duhamel; Beurré d'Effingham, round, hollow at the eye and stalk, much resembles Pomme Poire; Bon Chrétien Musqué resembles Bezi de Montigny; Crassane d'Hiver, like a Gilgil from a standard; Roi de Rome, probably Napoléon; Beurré de Flandres, appears to be the Beurré Rance; Princess d'Orange, doubtful; Beurré Bronzé, like that of Bréfort's collection, but different from that received from Van Mons; Orange d'Hiver, Buffour, Beurré d'Hiver, Van Mons' Beurré, middle-sized, obovate, colour of a russeted Beurré Diel: these are different from the sorts received under these names in the Society's Garden; Gros Retin d'Enghien, appeared to be the Catillac; Passe Colmar Doré, this is retained as distinct by various foreign nurserymen, but it is doubtless nothing but the Passe Colmar; Beurré Clargeau,

resembles the Beurré de Capiaumont; St. François, small, roundish, stalk short, skin russeted, said to be first-rate; Girondelle, or Jarvondelle, resembles the Beurré Rance; No. 1031. Seedling, 1853, middle-sized, obovate, colour of a russeted Beurré Diel; Langelier's Seedling Queen Victoria bore considerable resemblance to the Glout Morceau; No. 1019, unknown, in the way of St. Germain; Large Pear unknown, appeared to be the Bon Chrétien de Vernois; No. 297 unnamed, is probably the Burgermeester; Beurré Geribault, form of Passe Colmar; Duchesse de Berri d'Hiver resembled Beurré d'Aremberg; Nouvelle Doré, middle-sized, obovate, skin shining, yellowish: different from one received under this name in the garden, which was very like Doyenné Gris; Dutrior, middle-sized, roundish, with a long stalk, greenish-brown.

To Mr. Morgan, Gardener at Raynham Hall, near Fakenham, Norfolk, for ripe fruit of Cuthill's Black Prince Strawberry. They were stated to be from forced plants, which, after bearing an excellent crop in spring, were turned out into the open ground and their flowers removed. After being out some months, they were brought into a Vinery and encouraged to bear, and on the 20th of September a large dish was gathered from them. The fruits shown were small, but it was stated that up to the middle of November they were very fine.

II.—MISCELLANEOUS SUBJECTS OF EXHIBITION.

Mr. Hill, Gardener to R. Sneyd, Esq., of Keele Hall, Staffordshire, produced the following Pears, viz., Beurré Bosc, Glout Morceau, Duchesse d'Angoulême, Beurré Diel, Louise Bonne, and Marie Louise. With the exception of Glout Morceau, which was very green, these were fair fruit for the part of the country in which they were grown.

The Rev. J. E. Gray, of Wembley Park, Middlesex, sent two specimens, of the well-known baking Pear, Uvedale's St. Germain; they were off a west wall, the tree on which was stated to have borne 111 fruit. The specimens exhibited were reported to weigh respectively, when first gathered, 1 lb. 7 oz. and 1 lb. 4 oz.

Messrs. E. G. Henderson, of the Wellington Road Nursery, St. John's Wood, furnished a group of Chrysanthemums, but they

arrived too late for competition. The most striking among them was President Decaisne, a reddish-brown sort with a light centre, the two colours in the same bloom producing a charming contrast.

Of some new kinds exhibited by the last-named firm from M. Van Houtte, of Ghent, the following were the best, viz., Marcian, a medium-sized sort with pink petals, fading off at their points to white, thereby giving the flower the appearance of being striped or mottled; Jonas, a small-flowered sort with reddish-brown petals, tipped with yellow; and Mdle Angelique Richard, a medium-sized sort, with compact heads of flowers nearly white in the centre, with a pink rim round the circumference of each bloom, and altogether very pretty.

Messrs. Chandler, of Vauxhall, sent a collection of Pompone Chrysanthemums, not for competition. It consisted of Alveoliflorum, Justine Tessier, Junon, La Fiancée, Daphne, Fenella, Graziella, La Roussée, Mignonette, La Sapagon, Atropos, and Nelly.

From Messrs. Jackson, of Kingston, came a cut specimen of *Cissus discolor*, which was sent to show how unattractive the flowers of this plant are compared with the beauty of its charmingly variegated foliage. The former are almost inconspicuous, and perfectly worthless in a decorative point of view.

Mr. Lidgard, of Hammersmith, sent three heads of Manchester Solid Red, and a similar number of Wall's Invincible White Celery.

III.—ARTICLES FROM THE SOCIETY'S GARDEN.

Bilbergia Moreliana, a useful and rather handsome species of this somewhat neglected genus; a very fine variety of *Cymbidium giganteum*; several Pompone Chrysanthemums; a collection of Pears in which were Beurré gris d'Hiver Nouveau, a new sort likely to prove a good winter kind, and Epine Dumas, also new and promising.

Roots of the following vegetables also came from the Society's Garden, viz., Oca Rouge, *Gesnera esculenta*, a tender plant, *Oxalis Deppei*, and *Lathyrus tuberosus*, or what are called Dutch Mice. Since the failure of the Potato, roots of this kind have been brought into notice, in order to discover what could be made of them as food; but with the exception of *Oxalis Deppei*, little good has been done with them, and even the latter has of late years fallen greatly into disuse. As to the Dutch Mice, they are of about the same value as ground-nuts.

IV.—BOOKS PRESENTED.

The Athenaeum for October and November. From the Editor.

Transactions of the Royal Society of Edinburgh, Vol. XX. Part 4; and Proceedings of the same, Vol. III. No. 43. From the Society.

The Quarterly Journal of the Geological Society, No. 36. From the Society.

Bulletin de la Classe Physico-Mathématique de l'Académie Impériale des Sciences de Saint Petersburg, Tome XI. From the Académie.

The Literary Gazette for October and November. From the Publishers.

January 17th, 1854. (REGENT STREET.)

I.—ELECTIONS.

His Grace the Duke of Rutland, Belvoir Castle, Leicestershire; E. Rosher, Esq., 23, Upper Hamilton Terrace, St. John's Wood; and G. H. Taylor, Esq., Langton, Tunbridge Wells.

II.—AWARDS.

Banksian Medal :—

To Mr. Forbes, Gardener to the Duke of Bedford, at Woburn Abbey, for six bunches of Black Hamburg Grapes, three being this year's produce, and three being retarded fruit of last season's growth. The latter were remarkable for the small amount of shrivelling which they indicated, being almost as plump and fresh as the new bunches, which were also finely ripened and coloured.

To Messrs. Jackson, Nurserymen, Kingston, for plants of *Lycaste Skinneri*, *Warrea Lindeniana*, and *Barkeria Skinneri*.

Certificate of Merit :—

To Mr. Wortley, Gardener to Mrs. Maubert, of Norwood, for three bunches of Muscat Grapes, which, although of last year's produce, showed scarcely any symptoms of shrivelling.

To Mr. Brown, Gardener to J. Parnell, Esq., of Waltham Abbey, for ripe fruit of Cuthill's Black Prince Strawberry.

III.—MISCELLANEOUS SUBJECTS OF EXHIBITION.

Mr. Thomson, Gardener to Mrs. Byng, at Wrotham Park, furnished some Muscat Grapes. Good bunches, but very much shrivelled.

Mr. Munro, Gardener to Mrs. Oddie, at Colney House, St. Albans, also sent Muscat Grapes, considerably past their best, and along with them some bunches of West's St. Peter's.

From Mr. Jones, Gardener to Lady Charlotte Guest, Dowlais House, Glamorganshire, came a Queen Pine Apple, weighing 3 lbs. 7 oz. "The plant which produced it was grown in a 10-inch pot, in turfy peat, sand and broken oyster shells. This was merely an experiment which I intend trying again more extensively with winter fruit."

M. Langelier again furnished examples of Pears from Jersey, which, as before, served to show what fruits are cultivated under certain names in the Channel Islands. One labelled Duchesse de Berri appeared to be Mons. le Curé; Rouse Lench was Jaminette; Beurré de Flandres was B. Rance; Winter Crassane was true, and there were two kinds unknown, viz., Beurré de Gabert and Epine de Tours.

From M. Webber & Co., of Covent Garden, came very fine specimens, for the season, of Beurré Rance and Easter Beurré, Winter Nelis, Ne Plus Meuris, Old Colmar, and Jean de Witte, Pears all true to name.

J. Luscombe, Esq., F.H.S., of Combe Royal, near Kingsbridge, sent cut specimens of *Luculia gratissima*, and *Linum trigynum*. He said, "as a proof of the constitution of the plant, and of the climate of South Devon, I send the expanded portion of a bunch of flowers of *Luculia gratissima*, produced in the open air, in my garden. The plant is trained against an East wall, near a chimney, in which a fire daily burns; it has only had a ragged mat over it (which injured it), until the last few weeks, when a frame of rough boards was placed against it at night. Beside it is *Gardenia Fortuni* in very fair condition. Was this winter one of ordinary mildness, I think the *Luculia* would have been quite satisfactory, as there are five heads of bloom, on a plant about three feet high. The flowering spike of *Linum* is also from a plant growing on an open wall." As additional evidence of the mildness of the climate of Devon, it may be remarked that at a former meeting Mr. Luscombe exhibited some very fine Oranges and Lemons that had been grown on an open wall in his garden, where the only protection they received even in the coldest weather was a mat or two and some wooden shutters.

From E. Brande, Esq., of Turnham Green, came specimens of glass labels. They were made in the same way as common

apothecaries' phials, except that they had their tops closed up and their bottoms cut off. The latter is done for the purpose of admitting a slip of common paper (on which the name is written) into the bottle in such a manner that it can be most easily read through the glass, and then the end is stopped up with a common cork. Labels of this kind were more especially recommended for use in glass houses, where they would not be blown about and broken. They have this advantage over Mr. Bohn's glass labels, examples of which were exhibited last year, that the names can be changed at pleasure; whereas, Mr. B.'s, when once hermetically closed, as they are by the blowpipe, do not admit of the label being altered.

Specimens, showing the effect upon roots of Mr. M'Glashen's transplanting apparatus, were exhibited. It was mentioned that this apparatus has been objected to on account of the laceration a tree lifted by it necessarily sustains, in consequence of the rough manner in which it is wrenched out of the ground. It was further stated that although the transplanting of the large tree in the Society's Garden had proved perfectly successful, yet that some had attributed that success rather to the tree being a Poplar, one of the least liable of all trees to die from the operation of moving, and to the ground and weather favouring its well-doing, than to any merit that belonged to the machine. Mr. M'Glashen, however, in the following letter, opposed this view of the matter; he says: "In a former communication, referring to my transplanting machine, I stated that I had removed at least 1200 trees and shrubs within a circle of many miles round Edinburgh, and that all had succeeded, with three exceptions, the cause of the failure of which was explained. And I have now sent for inspection, as a specimen, the root of a Scotch Fir, removed by me in March last. In further confirmation of the success which has attended the use of my invention, I have much pleasure in enclosing a letter I have just received from Mr. Black, Ground Superintendent at Hamilton Palace, a gentleman whose intelligence and accuracy on such matters are undoubted. I have further the pleasure of stating, that the Caledonian Horticultural Society have appointed a committee to examine and report on the trees and shrubs I have transplanted round Edinburgh. When they have reported on this matter, I trust I will obtain permission to forward a copy of their report, as it is my earnest desire that the truth, the whole truth, and nothing but the truth, should be known as to the expedition and success of my transplanting

machines.”—Mr. Black’s letter, forwarded by Mr. M’Glashen, is as follows: “I have to state that I have closely watched the trees transplanted by you in the first week of August last, and my opinion is, that they are doing equally well as if they had never been removed from the spot they had previously grown in for years; and I must say that I was agreeably surprised, considering the time they were transplanted, to see them doing so well. I have also to state, that I have caused a great number of plants, shrubs, &c., to be transplanted by the machines which I purchased from you; and all these likewise have turned out well; indeed, so well am I satisfied with your invention, that in a short time I consider every Gardener will see the necessity of having the whole of your machines in his possession—or at least the three smallest sizes, which are so useful and handy in converting, in a very short space of time, even a bare and barren-looking spot into a pleasant and thriving garden. With ordinary care, and a little labour, it is also my opinion that any person can work them as well as the most experienced gardener, and with the same certainty of having all the transplanted trees doing well.—I have appended, in a tabular form, the names, height, and dimensions of fourteen shrubs transplanted here, under your own immediate superintendence.

SHRUBS TRANSPLANTED IN AUGUST, 1853.

Name of Shrubs.	Height.		Diameter.		Circumference.	
	Feet.	Inches	Feet.	Inches.	Feet.	Inches.
Portugal Laurel . . .	9	6	10	4	31	—
”	8	4	10	6	31	6
Arbor vitæ	15	—	9	—	27	—
”	15	4	8	6	25	6
”	16	2	10	4	31	—
”	14	4	8	6	25	6
Yew	9	—	11	—	33	—
”	10	—	13	—	39	—
”	10	6	16	4	49	—
”	11	3	17	6	52	6
”	12	4	13	9	41	3
”	11	6	15	2	45	6
Holly	10	4	9	3	27	9
”	15	6	10	11	32	9
Average	$12\frac{1}{12}$		$11\frac{9}{12}$		$35\frac{9}{12}$	

A. BLACK,
HAMILTON PALACE GARDENS.”

Alluding to the trees moved by Mr. Black, Mr. M'Glashen says : " Various parties to whom I have stated the facts referred to having expressed a decided opinion, that while the appearance of these trees might in the meantime be everything that could be desired, their future success was not secured, for they were certain that since August they could not in the nature of things have made any rootlets, I decided on distinctly ascertaining this point, and determined personally to examine the roots. Having now had a trench opened close to where these had been cut in August, I had the satisfaction of finding the whole face of the ball of an Arbor vitæ and Yew, so far as could be opened by the frost in the ground, crowded with rootlets. This appeared to me so satisfactory, that I have therefore sent a specimen of these for inspection, in the hope that they will confirm previous statements. The rootlets of the Arbor vitæ average at least four inches, but those from the Yew are so delicate, that I fear they will be decayed before they reach London, so that they will not be seen to advantage." These rootlets were fresh and vigorous. And in further confirmation of the merits of his machine, Mr. M'Glashen produced a Scotch Fir in two parts, viz., the root carefully removed from the soil, and the tree itself. Its height was eight feet two inches, circumference of branches seventeen feet, girth of stem ten inches, average length of rootlets made from those parts cut by the spades of the apparatus one foot four inches, but several of the longest were broken off in the lifting, and the length of shoot made last season, since removal, was one foot five inches. The main root measured three and a quarter inches in circumference at the part cut, and it had there made good rootlets, but several were wanting, having also been broken off in removal. The size of the ball when transplanted was two feet one inch square at the surface, one foot six inches at the bottom, and one foot five inches deep. The time taken to apply the apparatus and lift the tree with its ball to the surface was reported not to exceed ten minutes. These facts show therefore that the evidence, so far as it goes, is altogether in favour of the employment of Mr. M'Glashen's apparatus for lifting young trees ; but it was remarked, that satisfactory as it certainly is, it did not quite settle the question, because it must be admitted that there is a great difference between the demand made on the roots by a tree fifteen feet high for instance, and one fifty feet in height. The results of moving very large trees by this machine have, therefore, yet to be ascertained.

IV.—ARTICLES FROM THE SOCIETY'S GARDEN.

Various *Correas*, *Gesnera zebrina*, *Selago distans*, *Linum trigynum*, *Thysacanthus rutilans*, a promising scarlet-flowered plant, and the following salad vegetables, viz., Chou de Naples and Romaine Verte Maraichère Lettuces, both from frames; the Corn Salads Mache ronde and Mache d'Italie, Scarlet Short-top Radish from frames; Curled Cress, White Mustard, American Cress, Cole's Superb Red and Sutton's Superb Pink Celery, a very good variety; also Celeri Court hâtif, very full and solid, and by many preferred to the last-named kinds; Curled Chervil, French, Garden, and Broad-leaved Sorrel; in the late severe weather these required to be taken up out of the border and placed in a frame with a little heat; also Oseille de Belleville, a milder sort than the other Sorrels; together with Burnet, Chicorée fine d'Été, an excellent curled Endive for all seasons; and Scarole à fleur blanche, which blanches exceedingly pure—like ivory; Betterave rouge plat de Bassano, grosse longue de Hollande (Van Houtte), rouge de Castlenaudary, which is the most generally esteemed; and Barret's Crimson and Cattel's Blood-red Beet.

V.—BOOKS PRESENTED.

The Athenæum for December. From the Editor.

Bombay Magnetical and Meteorological Observations for 1849; and *Icones Plantarum Asiaticarum*, Part 3. By the late W. Griffith. From the Hon. the Court of Directors of the East India Company.

February 21st, 1854. (REGENT STREET.)

I.—ELECTIONS.

S. Dickenson, Esq., Tulse Hill; H. Pouncey, Esq., Finchley; and W. Wilson, Esq., 8, Lansdowne Terrace, Notting Hill.

II.—AWARDS.

Knightian Medal :—

To Messrs. Veitch, for *Cypripedium villosum*, a new addition to the genus from Moulmein, where it was found by Mr. T. Lobb, at an elevation of 5000 feet above the level of the sea. It much resembles *C. insigne*, differing more especially in the following particulars: the scape is shorter than the

leaves, and shaggy, with long purple hairs; the petals are singularly unequal-sided, the posterior half being twice as broad as the anterior, and much undulated; they are, moreover, notched at the point, as if a piece had been struck out by a circular punch; the lower sepal is apiculate, and not merely obtuse. There is a general resemblance in colour, but the upper sepal, instead of being decorated with dark circular spots, has merely a deeply discoloured set of veins along the middle, and the petals, which look as if varnished, are a rich warm brown on the upper or posterior half, but green on the lower half, with a deep rich brown line of separation.

Banksian Medal:—

To Messrs. Lee, of Hammersmith, for a flowering specimen of *Vallota miniata*, a beautiful greenhouse bulbous plant, with fleshy narrow pale green leaves, resembling those of *Clivea* (*Imatophyllum*) and the inflorescence of *Vallota purpurea*, from which it differs in the flowers being much smaller, of a clear delicate brilliant vermilion colour, passing into Indian yellow in their lower half, and in the tube not exceeding 4 lines in length. The sepaline divisions of the perianth are about one third narrower, and slightly shorter than the others. The stamens are somewhat declinate, and nearly as long as the perianth, in which respect, as well as in some others, this differs from the previously known species of *Vallota*. It has nevertheless (for the present at least) been placed in that genus. It was purchased by Messrs. Lee some years ago from Messrs. Backhouse, of York, who are said to have received its bulbs from Caffraria.

To Messrs. E. G. Henderson, of the Wellington Road Nursery, St. John's Wood, for a collection of *Cyclamens*. They were essentially all varieties of *C. persicum*; but they differed very much from that species in colour, varying from deep purple to pure white.

To Mr. Ingram, gardener to Her Majesty at Frogmore, for two handsomely grown smooth-leaved Cayenne Pine-apples, forming perfect cones in shape, and weighing respectively 6lb. 4oz. They were stated to have been produced by suckers, planted on a bed of leaves in March, 1853.

To Mr. Snow, gardener to Earl de Grey, F. H. S., Wrest Park,

Bedfordshire, for a collection of Pears, consisting of well-kept specimens of Chaumontel, Easter Beurré, Beurré Rance, Glout Moreceau, Old Colmar, and Ne Plus Meuris.

To Mr. Lewis Solomon, of Covent Garden, for an exhibition of Foreign Vegetables, consisting of good-looking white Asparagus, and green "Sprew," French Beans, excellent early Horn Carrots, Globe Artichokes, large White Broccoli, and young Spinach.

To the same for the following kinds of Salad Vegetables of foreign growth, viz., Cos and Cabbage Lettuces, Batavian and Curled Endive, Radishes, Taragon, and Chervil.

Certificate of Merit : —

To Mr. Atkins, of Painswick, Gloucestershire, for two large masses of a very dwarf, pale-coloured hybrid Cyclamen, called *C. Atkinsi*. "It was," says Mr. Atkins, "raised from *C. coum* impregnated with *C. persicum*; I find it to be equally hardy with *C. coum* and *vernum*. The specimens sent have been bloomed in a cold frame, and during the severe frosts of January were completely frozen *hard*, but immediately milder weather succeeded they came on rapidly into bloom, and even before either *C. coum* or *vernum* in the same frame; from seed, I find full two-thirds come exactly like the parent (*C. Atkinsi*), while the remainder varies from white and black to the usual colour of *coum*; some of the seedlings sown in August, 1852, are now in bloom, and I need not say that the plant is a most profuse flowerer."

To Mr. Butcher, of Stratford-on-Avon, for three bunches of Black Barbarossa Grapes, so plump and fresh as to be easily mistaken for new fruit. It was stated that one point of the greatest importance connected with this variety is that it will hang longer in a ripe state without shrivelling, than any other black Grape at present in cultivation, West's St. Peter's not excepted.

III.—MISCELLANEOUS SUBJECTS OF EXHIBITION.

Of Pears, J. Abell, Esq., sent from Limerick examples of Easter Beurré, Beurré Rance, Spring Beurré, Fortuné Parmentier, both from Pear and Quince stocks; Susette de Bavay, Rouse

Lench, Crassane d'Hiver Brunneau, Catillac, and some Royal Russet Apples. The Pears had been very much bruised, and had all more or less begun to decay.

Some very fine Pears of foreign growth were furnished by Mr. Lewis Solomon. They consisted of Easter Beurré, Belle Angevine, St. Germain, Winter Nelis, Passe Colmar, and Bon Chrétien; and along with them were the following kinds of Apples, viz., the White Calville, Reinette du Canada, and the pretty little Lady Apple, or Pomme d'Api of the French. These were all beautiful fruit, more especially the two first-named Apples, which possessed a transparency and brightness of colour such as they never attain in the climate of Britain.

From Mr. Freeman, gardener to W. O. Hunt, Esq., came Royal Nonpareil, Hunt's William Shakspeare, and Hunt's Duke of Gloucester Apples.

Messrs. Jackson, of Kingston, furnished *Barkeria elegans* and *Skinneri*: the latter was sent to show the time this Orchid will retain its beauty, the same plant having been exhibited at the meeting of December last.

Mr. Buck produced a well-bloomed specimen in a small pot of *Cyclamen persicum*.

From the Hon. Court of Directors of the East India Company came a slab of Deodar timber, from the North Western Provinces, measuring 18 feet 6 inches in length, 4 feet 6 inches in breadth, and 4 inches in thickness.

N. B. Acworth, Esq., of the Hook, Northan, Barnet, sent a branch of Cedar of Lebanon, brought by himself from Mount Lebanon.

The Vice-Secretary furnished various specimens of wood of Cedar of Lebanon, of English growth.

With regard to these different kinds of wood the Vice-Secretary observed that a great deal of interest had lately been excited respecting the Deodar and the Cedar of Lebanon, and the quality of their timber. No one had ever yet seen Deodar timber produced in this country, and therefore it was uncertain whether it would have the qualities ascribed to it in India, or remain merely as a tree of very great beauty, but of very little use. With a view to extend a knowledge of the real quality of the Deodar wood, the East India Company had caused some enormous planks of it to be imported, of which that mentioned above was one.

Dr. Royle, after referring to the magnificent specimen just alluded to, said that much interest had lately been felt, and much inquiry raised about the quality of this kind of timber. He would therefore endeavour, from his own knowledge of the native country of the tree, to answer this inquiry. The Deodar grows at an elevation of from 5000 to 12,000 feet, in a climate very changeable and often very cold. The natives of the Himalayas, he said, have a great variety of timber to choose from, but they invariably prefer the Deodar for all purposes. The Himalaya climate is very variable from March to June, and very fine and dry from the middle of June to the middle of September. The winter is very cold, and the mountains are for a considerable time covered with snow; so that there is as much variety as in a northern climate. If Deodar wood, he remarked, was used only in covered places, there would be no test of its durability, but it is used in the construction of temples, houses, and bridges, in damp and exposed situations; and by the peculiar mode of building adopted, it is as much exposed to the action of the weather as the stone which it is employed as an outside framework to support; and some of these erections have stood for centuries. It had been doubted whether the timber would be as good in this climate as in that of India; it was his opinion that it would. On this subject he read a letter from Mr. Wilson Saunders, of Lloyds, confirming his belief. That gentleman had examined the timber along with two other experienced persons, who coincided with him in giving a favourable report. Mr. Saunders had no hesitation in stating that it appeared to be superior to American Larch, or any other coniferous tree, and would be very useful for naval purposes. But if only as useful as the Larch and its allies, it must still be considered an article of great value. As a proof of the estimation in which American Larch is held, he mentioned that 20,000 tons of shipping are now building in North America of that wood alone. The Larch may be considered as intermediate between the hard woods and the soft woods, and he thought the Deodar should rank higher than the Larch. Dr. Royle considered this testimony highly satisfactory. As it regarded the question whether the timber would be equally good grown in this country as in India, he said an argument to the contrary had been based on the fact, that while great excellence was always accorded in ancient times to the wood of the cedar of Lebanon, that wood appeared, as grown in England, to be destitute of such good qualities. The argument is founded, however, on an error, inas-

much as ancient descriptions of the excellence of Cedar wood did not necessarily refer to the Cedar of Lebanon, but might have been applied to Junipers and other trees. The conditions essential to the growth of the Deodar in this country, he remarked, are free drainage, free ventilation, a low temperature, and considerable moisture. The mechanical condition of the soil did not appear to be very essential, but along with free drainage, a slow supply of nutriment was stated to be necessary to prevent the tree growing too rapidly. He considered that the Deodar was a valuable addition to our timber trees, and that every encouragement should be given to its culture in situations adapted to it.

The Vice-Secretary said a hypothetical argument against growing Deodar in this country for profit has been drawn from the supposed difference between the wood of the Cedar of Lebanon on Lebanon, and that produced in England. It has been said that though the Cedar of Lebanon may be of great excellence on the Syrian mountains, yet it is perishable and comparatively valueless with us. And hence it has been inferred that Deodar, however good it may be on the north-western mountains of India, must not be expected to possess any importance with us. The specimens before the meeting, however, demonstrated in the clearest possible manner that there is no appreciable difference between the quality of Cedar from Lebanon and from Middlesex. It being therefore certain that the quality of the Cedar of Lebanon is in no degree affected by English climate, as has been supposed; it is but reasonable to conclude, that neither will Deodar Cedar be so affected.

As to the distinction between Cedar of Lebanon and Deodar, he said, a strong belief is entertained by gentlemen whose opinion commands respect, that the one is a mere variety of the other. This point he remarked had already been fully discussed; but it is important to state that the timber of the Deodar is in one most essential particular distinct from Cedar of Lebanon. The latter is not only soft but very slightly scented, not much more so than some kinds of Deal; on the other hand, the fragrance of Deodar is so powerful that while the workmen were planting it in the meeting room, not only was the house filled with its sweet odour, but the smell was distinctly perceptible in the street when the door was left open. The shavings of it torch and flare with a great flame, but those of the Cedar of Lebanon, whether English or Syrian, burn with no more fierceness than shavings of Pine wood—in fact, they are as dry to the touch; while, on the contrary,

those of Deodar are remarkably unctuous. Here, at least, is a great practical distinction, which is of itself sufficient to account for the different quality of the two woods, and strongly indicates a real specific difference. It was learned also, from Mr. Acworth, that the old trees he saw on Lebanon were gnarled like our own old forest trees, while the forests of Deodar which he had visited in India reminded him of a mass of gigantic Larches. Finally he remarked that the Deodar seems to deserve what has been reported of it, and to have a higher claim upon the attention of the planter for mere profit than any coniferous tree yet discovered. As a nurse, it might, ere long, supersede the Larch.

From Messrs. Veitch came a portrait of *Wellingtonia gigantea*, together with specimens of the wood, bark, and cones, of that tree.

C. Halkett Inglis, Esq., of Cramond House, Edinburgh, furnished specimens of the roots of a Sycamore tree, fifty-one feet high, which had been successfully transplanted by one of Mr. McGlashan's machines, in the spring of 1853.

IV.—ARTICLES FROM THE SOCIETY'S GARDEN.

The large striped Crocus called Sir Walter Scott, *Thyrsacanthus rutilans*, a hybrid Begonia, and a variety of *Azalea squamata*, which was stated to differ from the race of Indian Azaleas now in cultivation, in having much more transparent flowers, and in coming several weeks earlier into blossom without any artificial excitement.

Of vegetables, the garden furnished *Laitue Romaine Verte* *Maraîchère*, the sort of Cos Lettuce grown by the French in winter; *Laitue Chou de Naples*, one of the sorts of Lettuces distributed by the Society, and which is esteemed the best Cabbage Lettuce in cultivation. Marshall's Black Spine Cucumber, which answers well for early forcing, requiring plenty of heat; *Persil à grosses racines*, a kind of Parsley, whose long Carrot-shaped roots are cooked; it resembles the *Hamburgh Parsley*, but differs in the leaves, which are more curled than those of the *Hamburgh*, or broad-leaved. The flavour of Parsley can be obtained from this just as that of Celery is from the roots of *Celeriac*, in climates and under circumstances where the stalks and leaves could not exist. The plants are easily grown, and the roots might form part of the vegetable stores of shipping.

The following cuttings of fruit-trees were distributed :—

Cerise Reine Hortense, a juicy, sweet Cherry, whose synonyms are Cerise Monstrueuse de Bavay, Hybride ou Belle de Lacken, Louis XVIII., Morestru, Rouvroy, Guigne de Petit Brie, and Reine des Cerises.

Donna Maria, said to be a large Cherry, of first-rate quality, ripening in Belgium, in the end of July.

Bigarreau d'Octobre; fruit not large, but very late; it is the latest sweet Cherry.

Josephine de Malines Pear: middle sized, turbinate, brownish red next the sun. Flesh melting, buttery and sugary, with a flavour somewhat resembling that of the Passe Colmar. Ripens, January—March. A valuable late Pear.

IV.—BOOKS PRESENTED.

Le Bon Jardinier for 1854. From M. Vilmorin.

The Athenæum for January. From the Editor.

The Quarterly Journal of the Geological Society, No. 37. From the Society.

Journal of the Royal Agricultural Society of England, Vol. XIV. Part II. From the Society.

Description succinète de quelques Fruits, &c., par M. J. De Liron D'Airoles. From the Author.

March 7th, 1854. (REGENT STREET.)

I.—ELECTIONS.

The Right Hon. the Earl of Ducie, Tortworth Court, Gloucestershire.

II.—AWARDS.

Banksian Medal:—

To Messrs. Henderson, Pine Apple Place, for examples of *Conoclinium ianthemum*, *Franciscea confertiflora*, *Acacia longifolia*, and other plants.

Certificate of Merit:—

To Messrs. Veitch, for *Acacia Drummondii*, a handsome new species from Swan River.

To the same, for *Boronia Drummondii*, another new shrub from the same colony, with rose-coloured flowers very brilliant and showy, and foliage in the way of *B. pinnata*.

To Mr. Hume, Gardener to R. Hanbury, Esq., F.H.S., the Poles, Hertfordshire, for a flowering specimen of *Cymbidium eburneum*.

To Mr. Butcher, Gardener to W. Leaf, Esq., Park Hill, Streatham, for three bunches of Muscat of Alexandria Grapes.

III.—MISCELLANEOUS SUBJECTS OF EXHIBITION.

Messrs. Veitch sent a specimen of *Sarracenia purpurea* in flower, the latter consisting of two round compact heads or little bundles of purplish brown leaves elevated on long slender flower-stems that shot up from among the pitchers. It was mentioned that in its native country, the latter form excellent fly-traps, the hairs, in their interior, pointing as they do downwards, permitting the flies to enter with facility; but when once in, effectually preventing their escape.

Messrs. Rollisson produced *Lycaste brevispatha*, a species probably not distinct, except in colour, from *L. leucantha*.

From Mr. Bennett, gardener to J. Smith, Esq., of Dulwich, came six pots of Cuthill's Black Prince Strawberry.

Concerning this variety Mr. B. says "I find that the most successful method of fruiting it, is to get the crowns well ripened in autumn. They want no larger pots than 5-inch ones; the plants were just put into an early Vinery in December, where there was a very gentle heat, and they were brought slowly on with the vines, watering them with liquid manure, and the result is an excellent crop. Last year I had ripe fruit by the middle of February. I need not say that this variety is an excellent cropper either in doors, or out."

Mr. Lewis Solomon, of Covent Garden, produced a punnet of Strawberries, consisting of Cuthill's Black Prince, and Keen's Seedling, mixed together.

Examples of "Majolica" Vases, flower-pots and stands of various colours and devices, were furnished by Mr. Goode, of South Audley Street, Grosvenor Square.

Wood of the following Coniferous trees was laid before the meeting:—

A plank of Cedar of Lebanon from a tree raised at Highclere, in 1773, from native seed presented to the 1st Earl of Carnarvon by Dr. Pococke.

Also wood of *Abies Douglasi*, *Larix Americana*, *Callitris quadrivalvis*, *Pinus insignis*, *P. Laricio*, and *Cupressus torulosa*.

IV.—ARTICLES FROM THE SOCIETY'S GARDEN.

Trymalium odoratissimum; *Azalea ramentacea*, a small-flowered white kind, which appears to hold its foliage better than the common white *Azalea*; the hardy evergreen *Berberis Darwini* from a greenhouse, in which its bright orange yellow flowers are very ornamental in early spring; *Echeveria retusa*; a collection of Chinese *Primulas* and some other plants.

Cuttings of the following Pears were distributed:—

Louise d'Orleans: fruit middle-sized, oblong, melting, and said to be of first-rate quality; ripening in November.

Délices de Jodoigne: tree vigorous, said to be very productive; fruit large, melting, and rich; season October.

Ze Zamuri from Tiflis: sent to the Society by Messrs. Baumann, of Bolwiller, but has not yet fruited in the Garden.

Also the following Plum: Corse's Dictator: large, purple, and rich; an American variety.

V.—BOOKS PRESENTED.

The Athenæum for February. From the Editor.

Journal of the Royal Geographical Society, Volume XXIII. and General Index to the Second ten volumes of the Journal of the same from the Society.

March 21st, 1854. (REGENT STREET.)

I.—ELECTIONS.

Sir J. Davis, Bart., Holywood, near Bristol; T. F. Baily, Esq., Hall Place, Tunbridge; G. E. Frere, Esq., Roydon Hall, Diss; Dr. Madden, 10, Pavilion Parade, Brighton.

II.—PAPERS READ.

Remarks on the Cultivation of Hyacinths in Glasses. By the Rev. W. B. Hawkins, F.H.S. (This paper will be found at p. 131 of the present volume).

Also some observations on the Fluke Potato, and a seedling from it, by Mr. John Edwards, F.H.S.

III.—AWARDS.

Knightian Medal :—

To Mr. Gaines, of Battersea, for *Rhododendron* Princess Alice in the form of a tree some 10 feet high, profusely covered with large heads of white flowers delicately suffused with pink, each floret being prettily spotted in the upper petals with minute brown dots.

To Messrs. Rollisson, of Tooting, for a collection of Orchids, consisting of *Dendrobium* Farmeri, *D. macrophyllum*; three kinds of *Vanda*, all referable to *V. suavis*; two forms of *Cattleya Harrisoniæ*, *Barkeria elegans*, a pale variety of *Sobralia macrantha*, and other plants.

To Messrs. Henderson, of Pine Apple Place, for *Acacia celastriifolia*, *Eriostemon scabrum*, *Boronia triphylla*, *Æschynanthus speciosus*, and a basketful of pretty little flowering plants of the hardy Sikkim-Himalayan *Rhododendron ciliatum*.

Banksian Medal :—

To Messrs. Lee, of Hammersmith, for an exhibition of Camellias, among which the most strikingly beautiful was a sort called *De la Reine*, a well-fermed, good-sized, white flower, with a tinge of creamy yellow in the centre.

To Mr. Lewis Solomon, of Covent Garden, for examples of the following salad vegetables of foreign growth, viz., Lettuces, Endive, Turnip Radishes, Blanched Chicory, or *Barbe de Capucine* of the French, Tarragon, and Chervil.

Certificate of Mérit :—

To Mr. Gaines, for a young plant of *Rhododendron javanicum* in flower.

To C. B. Warner, Esq., F. H. S., for a high-coloured, slender variety of *Dendrobium transparens*.

To Mr. Brown, gardener to F. Parnell, Esq., of Waltham Abbey, for three pots of Keen's Seedling Strawberry.

To Mr. Higgs, Gardener to Mrs. Barchard, for an exhibition of Keen's Seedling Strawberry, not in pots.

IV.—MISCELLANEOUS SUBJECTS OF EXHIBITION.

Mr. Gaines furnished a finely-flowered specimen of *Azalea* "Mont Blanc."

Messrs. Veitch sent a cut specimen of *Rhododendron* with a compact head of white flowers richly spotted with brown. It was named *R. picturatum superbum*, and appeared to be a hybrid from *R. maximum* crossed with *arboreum*.

From Messrs. Chandler, of Vauxhall, came *Camellia formosa*, a kind resembling *imbricata*, but stated to have been a seedling from Waratah.

A block of Larch, from the Right Hon. T. F. Kennedy's estate, near Maybole, in Ayrshire, was exhibited. It was a section of a tree about two feet in diameter, and beside it was placed a specimen of American Larch, or Hackmatack. The latter was produced to show its difference from European Larch, and its similarity to Deodar.

Specimens of the timber of the two English kinds of Oak (*Quercus pedunculata* and *Q. sessiliflora*) and of Spanish Chestnut, were furnished by the Vice-Secretary, in order to exhibit the difference that exists between the woods of the pedunculate and sessile-flowered kinds and Chestnut, for which the timber of the last-named Oak, when found in old buildings, has often been mistaken. It was, thus, proved by specimens from Westminster Abbey, that the timber in the roof of that building is not Chestnut, as is still by many believed, but sessile-flowered Oak, which, although softer, more pliable, and easily worked, was stated to be in most respects quite equal to the common pedunculate kind.

V.—ARTICLES FROM THE SOCIETY'S GARDEN.

Deutzia gracilis, *Prunus sinensis*, *Dielytra spectabilis* and other plants, together with the following salad vegetables, viz., Laitue

Romaine verte Maraichère and Laitue Chou de Naples, the former a green Cos, the latter a Cabbage Lettuce, both from cold frames, which were covered on several nights with Frigi domo; Scarole à fleur blanche, Oseille de Belleville, French Sorrel, and Broad-leaved Sorrel, Curled Chervil, Normandy Cress, and the two kinds of Lamb's Lettuce, or Corn Salad, called by the French Mâche d'Italie, and Mâche ronde. Concerning the Lettuces, it should be stated that they had been watered occasionally with manure water.

VI.—BOOKS PRESENTED.

Journal of the Statistical Society, Vol. XVII. Part I. From the Society.

April 4th, 1854. (REGENT STREET.)

I.—AWARDS.

Knightian Medal :—

To Mr. Packman, Gardener to J. Gadesden, Esq., F. H. S. Ewell Castle, Surrey, for a flowering specimen of *Rhododendron Dalhousianum*, the first plant of the kind that has blossomed in England. The only other place in which it had blossomed in Britain was Dysart House, in Fifeshire, where it produced flowers last year, under the care of Mr. Laing, gardener to the Earl of Rosslyn. Mr. Gadesden's plant had had five blooms on it; but two of them had dropped; of the three flowers left behind, each corolla measured about $4\frac{1}{2}$ inches in diameter, and as much in length. They somewhat resembled the flowers of the white Lily (*L. candidum*), except that they were deeply tinged in the throat with yellow. Notwithstanding their great size, they were not at all flimsy in texture; on the contrary, the petals were thick, and the flowers extremely well formed. When it is considered that a single stem, some 18 inches in height, produced five flowers, the display that may be expected to be made by a large specimen, covered with blossoms of the dimensions stated, must be grand indeed; and therefore, whether this *Rhododendron* prove hardy or not, it must certainly be regarded as a great acquisition.

To Messrs. Rollisson, of Tooting, for a collection of Orchids,

consisting of *Cattleya citrina*, which is found on the branches of Oak-trees in Mexico; *Cattleya Skinneri*, *Dendrobium albo-sanguineum*, *D. densiflorum*, *Chysis bractescens*, *Oncidium phymatochilum*, and a fine variety of *Anguloa Ruckeri*. Instead of being yellow, with blood-red dots, like the original, the inside of the last-named flower is one uniform rich chocolate brown; the terminal lobe of the lip is, moreover, broader and concave, not flat. It is called *A. Ruckeri sanguinea*.

Banksian Medal:—

To Messrs. Lane, of Great Berkhamstead, for four boxfuls of beautiful Rose blooms, which were stated to have been selected from no fewer than 500 plants.

To Messrs. Henderson, of Pine Apple Place, for a collection of Hyacinths; but more especially for the following sorts, viz., double:—Prince of Waterloo, L'Eclipse, Jaune Supreme, Madame Marmont, Triumph Blandina, and Laurens Koster; single:—Queen of the Netherlands, Orondates, Lord Grey, Gumal, Baron Van Thuyll, and Mrs. Beecher Stowe.

Certificate of Merit:—

To Messrs. Veitch, for a variety of *Dendrobium macrophyllum* with a fine spike of flowers, nearly four times as large as those of the ordinary state of the plant.

To Messrs. Henderson, Pine Apple Place, for *Cheiranthra linearis*, a New Holland Plant, spoken of many years ago, by Mr. Allan Cunningham, as being a shrub of great beauty. It has violet, or rather blue starry flowers of sufficient size to be showy; but unfortunately, owing to the want of bright sunlight in the room, they did not open, and therefore its beauty could not be seen. It was mentioned that wild specimens, showed the plant to be much more robust than that exhibited, which was small and somewhat attenuated.

II.—MISCELLANEOUS SUBJECTS OF EXHIBITION.

Messrs. Veitch sent a variety of *Calanthe vestita*, the red colour in the eye of which was not so dark as in the best form of that plant.

From Messrs. Henderson, of Pine Apple Place, came a small example of *Elaeocarpus dentatus*, covered with little white, toothed, bell-shaped flowers, two *Acacias*, *Eriostemon linearifolium*, *Boronia tetrandra*, small plants of *Grevillea lavandulacea*, *Daviesia pungens*, and *Gastrolobium Drummondii*.

Of Camellias J. Allnutt, Esq., F.H.S., of Clapham Common, sent two blooms, one white and the other red; both from the same tree, which had been in cultivation many years, but had never been known to sport in a similar manner before. It was remarked that this circumstance was a good illustration of the way in which many of the existing varieties, not only of Camellias, but also of other flowers and fruits, have from time to time been obtained; and Coe's Golden Drop Plum, which was stated to have sported in a similar way from the Magnum Bonum, was adduced in confirmation of the statement.

A dish of Keen's Seedling Strawberries was shown by Mr. Brown, Gardener to F. Parnell, Esq., of Waltham Abbey, Essex.

Dr. Royle drew the attention of the meeting to specimens of paper, rope, cordage, and other substances prepared from the Plantain (*Musa paradisiaca*). He also entered into highly interesting details concerning the amount of produce obtainable from an acre of Plantain ground, independently of the fruit, for which alone the plant is now cultivated in the greater part of the tropics. The paper, although for the most part unbleached, and not prepared with European skill, was of the best quality as regarded strength and fineness. Some of it was of a delicate cream colour. The threads of the *Musa textilis* constituted, he observed, the invaluable Manilla hemp. After going into numerous statements upon these important points, he directed attention to a living plant of the *Boehmeria nivea*, Chou-ma, or China Grass, also called occasionally, though erroneously, Manilla hemp. Specimens of the raw material and of exquisite manufactures prepared by the Chinese from this plant were laid upon the table; the excessive strength of its fibres was pointed out, and it was shown that the Indian province of Assam was capable of alone supplying an unlimited quantity of the material.

The Vice-Secretary produced a specimen of the China Grass plant from Shanghae, and remarked that since it was capable of enduring the climate of so cold a part of China it might be reasonably expected to succeed as a field crop in the west and south of Ireland. It had this advantage over common hemp.

that it was perennial, not annual, and afforded two or three cuttings in a year; so that it might be found both cheaper to grow, and more productive, as well as of far better quality than hemp itself.

III.—ARTICLES FROM THE SOCIETY'S GARDEN.

Specimens of *Rhynchospermum jasminoides*, *Weigela amabilis*, three kinds of *Azalea*, the Sikkim *Rhododendron theae-florum*, two *Eriostemons*, and other plants, among which was the beautiful *Tropæolum Triomphe de Gand*, which is one of the most showy and useful of the genus.

April 18th, 1854. (REGENT STREET.)

I.—ELECTIONS.

Sir W. W. Wynn, Bart., 18, St. James's Square; H. Akroyd, Esq., Doddington Park, Nantwich; W. E. Hubbard, Esq., 24, Palace Gardens, Kensington.

II.—AWARDS.

Banksian Medal:—

To Messrs. Lee, of Hammersmith, for a collection of plants, consisting of two well-grown specimens of *Eriostemon*, *Pultenæa biloba*, two *Azaleas*, one *A. vittata*, the other *A. amœna*, and one or two *Epacris*es.

To Messrs. Lane, of Great Berkhamstead, for beautiful specimens of *Rhododendron campanulatum*, and a new variety of that species called *General Napier*.

To Mr. Fleming, gardener to the Duke of Sutherland, F.H.S., at Trentham, for a dish of *May Duke Cherries*, large, plump, and well coloured.

Certificate of Merit:—

To Messrs. Standish and Noble, for *Rhododendron alstroemeroides*, a hybrid remarkable for its showy heads of small

rosy flowers, which are covered all over with short dark-coloured bars, like those of the blossoms of some *Alstræmerias*. It was stated to be a continental kind, the history of which is unknown.

To Messrs. Henderson, of Pine Apple Place, for four pots of *Viola pyrolæfolia*, a hardy yellow-flowered scentless species from Patagonia.

To Messrs. Lucombe, Pince, and Co., of Exeter, for *Calceolaria Ajax*, a dwarf shrubby bedding kind, remarkable for its great trusses of brown and yellow blossoms, which require no sticks to support them owing to the sturdy habit of the plant by which they are produced. It was stated to be from Sultan, crossed with some high-coloured shrubby variety.

To Mr. Keeble, gardener to H. Davies, Esq., Woodlands, Isleworth, for a very finely flowered *Tropæolum tricolorum*, completely covering a circular wire trellis about four feet in diameter.

To Mr. Gaines, of Battersea, for a well-flowered specimen of *Azalea Holfordiana*.

To Mr. Dunsford, of Chingford, for a fine plant of *Epidendrum Stamfordianum*.

To Messrs. Jackson, of Kingston, for *Dendrobium pulchellum* and *Vriesia speciosa*, the latter with two long feather-like spikes of scarlet inflorescence.

To Mr. Dobson, Woodlands Nursery, Isleworth, for eight plants of *Cineraria*, all well grown and beautifully flowered.

To Mr. Bennett, of Dulwich, for a dish of British Queen Strawberries.

To Mr. Spary, of Brighton, for six well-coloured bunches of Black Hamburgh Grapes.

III.—MISCELLANEOUS SUBJECTS OF EXHIBITION.

Messrs. Standish and Noble furnished a "worked" plant of *Rhododendron Edgeworthi* in bloom; but owing to its having been forced into that condition somewhat prematurely, the two large white blossoms, which it had produced, were not at all nicely expanded, and the delicious fragrance for which this species is so remarkable was only just perceptible in them. From the

thick coating of brown fur in which this plant is enveloped it was thought that it might possibly prove hardy, but such has not been the case, for it was killed last winter in the Society's Garden and elsewhere, while *R. ciliatum* and some other Sikkim kinds have survived.

The same firm also furnished an *Indigofera*, apparently a bad variety of *I. decora*, but hardy; and several small plants of a white semi-double Chinese *Azalea* called *narcissiflora*, a free blooming kind, even in a very young state.

Messrs. Weeks and Co. showed *Aphelandra lateritia*, a handsome stove plant from Guatemala, where it was found by Mr. Skinner. The leaves are in texture like those of *Passiflora laurifolia*, and have stalks fully as long as the blade. The flowers form a cone-like head four or five inches long, with dull scarlet corollas, the tube of which is rather yellow. It was stated to be very different from any of the species described in De Candolle's *Prodromus*.

From Messrs. Henderson came a large plant of *Maranta sanguinea*.

Mr. Gaines sent *Rhododendron aureum* and *R. dilectum*, the former one of the best of the yellow kinds.

J. Allnutt, Esq., F.H.S., produced a dish of Keen's Seedling Strawberry.

From Mr. John Edwards, F.H.S., came three punnets of Potatoes, the first containing Lapstone Kidney; the second, the Fluke, a Lancashire kind, said never to have been attacked by disease; and the third a Seedling from the Fluke.

IV.—ARTICLES FROM THE SOCIETY'S GARDEN.

Beautiful clusters of cut flowers of the white *Glycine sinensis*, and also of the ordinary form of that plant, both of which were found by Mr. Fortune in the woods of Chusan, the only place where it has yet been seen wild; *Indigofera decora* and fruits of *Citrus japonica* or Cum-quat, from a plant which has just begun to bear in the Garden; the fruit is small, oblong, and orange-coloured; it is preserved in sugar by the Chinese. The rind is extremely fragrant.

The Garden also supplied some Neapolitan Cabbage Lettuces,

a portion of which had been grown under Mr. Pilkington's bell-glasses, which differ from the French cloche in having a ventilator at the top, in the shape of a neck or chimney, which can be left open or kept close as may be desired, by covering it over or not with another small bell-glass, made for the purpose. In this way, damp from the soil, which is often so destructive to winter Lettuces, can be let off without tilting up the side or moving the bell-glass in any way, as has to be done in the case of cloches whenever air is given. The result of this trial has been very satisfactory—for, of a ridge of Lettuces planted out last October, those which had bell-glasses put over them on the 27th of last month have attained nearly double the size of such as were left unprotected; but which, in all other respects, were treated precisely like them. It was mentioned, however, that bell-glasses can, unfortunately, only be had in the neighbourhood of places where they are made; for, owing to the difficulty of packing them in small compass, the packing and carriage cost more than the original value of the glasses themselves.

V.—BOOKS PRESENTED.

The Athenæum for March. From the Editor.

Comptes Rendus des Séances de l'Académie des Sciences, Vols. XXX. to XXXVII.

From the Academy.

Mémoires de l'Institut de France, Vols. XXIII. and XXIV. From the Institute.

May 1st, 1854. (REGENT STREET.—ANNIVERSARY.)

The following Fellows of the Society, viz.

General Fox,
J. C. Whiteman, Esq.,
Rev. W. B. L. Hawkius,

were elected new Members of the Council in the room of

The Duke of Northumberland,
Sir P. Pole, Bart.,
R. S. Holford, Esq.

The following Fellows of the Society were elected Officers for the ensuing year, viz.:—

The Duke of Devonshire, President;
J. R. Gowen, Esq., Treasurer;
Dr. Royle, Secretary.

The Annual Report from the Council and Auditors was read.
(See the body of this Volume.)

It was resolved unanimously that the report now read be adopted.

May 13th, 1854. (GARDEN EXHIBITION.)

Nothing could be more brilliant than the exhibition of flowers and fruits on this occasion. Such Roses and such Azaleas have rarely been seen. Orchids too were abundant and excellent, and Stove and Greenhouse Plants numerous and fine. Those to which the first prize was awarded were models of cultivation. The new arrangements for rewarding fruit appeared to have been acceptable to gardeners, for no May show in remembrance produced so great an abundance of such remarkable excellence.

The award was as follows:—

The First Large Gold Medal:—

To Mr. Green, Gardener to Sir E. Antrobus, Bart., F.H.S.,
for a collection of twenty Stove and Greenhouse Plants.

To Mr. Williams, Gardener to C. B. Warner, Esq., F.H.S.,
for twenty species of Exotic Orchids.

The Second Large Gold Medal:—

To Mr. Gilham, Gardener to J. R. Scott, Esq., of Leyton,
Essex, for a collection of twenty Stove and Greenhouse
Plants.

To Mr. Blake, Gardener to J. H. Schroder, Esq., F.H.S., for
twenty species of Exotic Orchids.

The First Gold Knightian Medal:—

To Mr. Hamp, Gardener to J. Thorne, Esq., of South Lam-

beth, for a collection of fifteen Stove and Greenhouse Plants.

To Mr. Woolley, Gardener to H. B. Ker, Esq., of Cheshunt, for twenty species of Exotic Orchids.

The Second Gold Knightian Medal :—

To Mr. Rhodes, Gardener to J. Phillpot, Esq., of Stamford Hill, for a collection of fifteen Stove and Greenhouse Plants.

To Mr. Carson, Gardener to W. F. G. Farmer, Esq., F.H.S., for twenty species of Exotic Orchids.

To Messrs. Lane, of Great Berkhamstead, for twelve distinct varieties of Greenhouse Azaleas.

The First Gold Banksian Medal :—

To Mr. Dods, Gardener to Sir J. Cathcart, Bart., F.H.S., for ten species of Exotic Orchids.

To Messrs. Rollisson, of Tooting, for fifteen species of Exotic Orchids.

To Mr. Dods, Gardener to Sir J. Cathcart, Bart., F.H.S., for a collection of six Stove and Greenhouse Plants.

To Messrs. Rollisson, of Tooting, for ten varieties of Cape Heaths.

To Mr. Green, Gardener to Sir E. Antrobus, Bart., F.H.S., for twelve distinct varieties of Greenhouse Azaleas.

To Mr. Dobson, of Woodlands Nursery, Isleworth, for a collection of twelve Pelargoniums in 8-inch pots.

To Messrs. Lane, of Great Berkhamstead, for twelve varieties of Roses in pots.

To Mr. Busby, Gardener to J. Crawley, Esq., F.H.S., for the same.

To Mr. Fleming, Gardener to the Duke of Sutherland, at Trentham, for a collection of Fruit.

The Second Gold Banksian Medal :—

To Mr. Green, Gardener to Sir E. Antrobus, Bart., F.H.S., for ten species of Exotic Orchids.

To Mr. Carson, Gardener to W. F. G. Farmer, Esq., F.H.S., for a collection of six Stove and Greenhouse Plants.

- To Mr. Jarvis, Gardener to J. Ruck, Esq., of Croydon, for ten varieties of Cape Heaths.
To Mr. Over, Gardener to W. McMullen, Esq., of Clapham, for twelve varieties of Greenhouse Azaleas.
To Mr. Francis, F.H.S., of Hertford, for twelve varieties of Roses in pots.
To A. Rowland, Esq., F.H.S., for the same.
To Mr. Clements, of Oak Hill, East Barnet, for a collection of Fruit.

The Silver Gilt Medal:—

- To Mr. Clarke, of Highgrounds, Hoddesdon, for ten species of Exotic Orchids.
To Mr. Peed, Gardener to T. Tredwell, Esq., of St. John's Lodge, Norwood, for a collection of six Stove and Greenhouse Plants.
To Mr. Taylor, Gardener to J. Coster, Esq., of Streatham, for a collection of six Stove and Greenhouse Plants.
To Mr. Peed, Gardener to T. Tredwell, Esq., of Norwood, for ten varieties of Cape Heaths.
To Mr. Taylor, Gardener to J. Coster, Esq., of Streatham, for six varieties of Greenhouse Azaleas.
To Messrs. Paul, of Cheshunt, for twelve varieties of Roses in pots.
To Mr. Sage, Gardener to W. R. Robinson, Esq., of Acton, for the same.
To Messrs. Veitch, F.H.S., for a new Indian Rhododendron.
To Mr. Martin, Gardener to Sir H. Fleetwood, Bart., F.H.S., for a collection of Grapes.
To Mr. Smith, of Twickenham, for British Queen Strawberries in pots, and gathered.

The Large Silver Medal:—

- To Mr. Morris, Gardener to Coles Child, Esq., of Bromley, for a collection of six Stove and Greenhouse Plants.
To Mr. Over, Gardener to W. McMullen, Esq., of Clapham, for six Stove and Greenhouse Plants in 13-inch pots.
To Mr. Roser, Gardener to J. Bradbury, Esq., F.H.S., for six varieties of Cape Heaths.
To the same, for six varieties of Greenhouse Azaleas.

- To Mr. Mockett, Gardener to J. Allnutt, Esq., F.H.S., for six Fancy Pelargoniums.
To Mr. Green, Gardener to Sir E. Antrobus, Bart., F.H.S., for six varieties of Tall Cacti.
To Messrs. Veitch, F.H.S., for *Cypripedium villosum*.
To Mr. Breadley, Gardener to S. M. Peto, Esq., F.H.S., for a collection of Grapes.
To Mr. Turnbull, Gardener to the Duke of Marlborough, for a Cayenne Pine-apple weighing 4 lb. 14 oz., and a Lemon Queen Pine-apple weighing 3 lb. 13 oz.
To the same, for British Queen and Keen's Seedling Strawberries.

The Silver Knightian Medal:—

- To Mr. Dods, Gardener to Sir J. Cathcart, Bart., F.H.S., for six Stove and Greenhouse Plants in 13-inch pots.
To Mr. Over, Gardener to W. McMullen, Esq., of Clapham, for six varieties of Cape Heaths.
To Mr. Peed, Gardener to T. Tredwell, Esq., of Norwood, for six varieties of Greenhouse Azaleas.
To Mr. Gaines, F.H.S., of Battersea, for six Fancy Pelargoniums.
To Mr. Taylor, Gardener to J. Coster, Esq., of Streatham, for six *Helichrysums*.
To Messrs. Veitch, for *Vanda suavis*.
To Messrs. Garraway, of Bristol, for *Hedera tulipiferum*.
To Mr. Jennings, Gardener to the Earl of Derby, for a collection of Grapes.
To Mr. Jones, Gardener to the Lady Charlotte Guest, for a Ripley Queen Pine-apple, weighing 4 lb.
To Mr. Ivison, Gardener to the Duke of Northumberland, F.H.S., for Keen's Seedling Strawberries.
To Mr. Shuter, Gardener to the Earl of Wilton, for May Duke Cherries.

The Silver Banksian Medal:—

- To Mr. Jarvis, Gardener to J. Ruck, Esq., of Croydon, for six Stove and Greenhouse Plants in 13-inch pots.
To Messrs. Pamplin, of Lea Bridge Road, for the same.
To the same, for six varieties of Cape Heaths.

- To Mr. Dods, Gardener to Sir J. Cathcart, Bart., F.H.S., for
Gompholobium polymorphum.
- To Messrs. Veitch, F.H.S., for Hexacentris lutea.
- To Messrs. Lee, of Hammersmith, for Azalea Indica Iveryana
- To Mr. Forbes, Gardener to the Duke of Bedford, F.H.S.,
for Black Hamburgh Grapes.
- To Messrs. Mitchell, of Brighton, for the same.
- To Mr. Spencer, Gardener to the Marquis of Lansdowne, for
Black Hamburgh Grapes and Chassélas Musqué Grapes.
- To Mr. Spary, of Brighton, for Black Hamburgh Grapes.
- To Mr. Dods, Gardener to Sir J. Cathcart, Bart., F.H.S., for
the same.
- To Mr. Jennings, Gardener to the Earl of Derby, for a Black
Jamaica Pine-apple weighing 3 lb. 5 oz.
- To Mr. Ironmonger, Gardener to S. R. Heseltine, Esq., F.H.S.,
for British Queen Strawberries.
- To Mr. Busby, Gardener to J. Crawley, Esq., F.H.S., for
Brown Turkey Figs.
- To Mr. Jennings, Gardener to the Earl of Derby, for May
Duke Cherries.
- To Mr. Scrogie, of Sonthill Gardens, Beds., for Snow's Prolific
Melon.

The First Certificate:—

- To Mr. Clarke, Gardener to Mrs. Webb, of Hoddesdon, for
Ixora coccinea.
- To Messrs. Henderson, of Wellington Road, St. John's Wood,
for Eucharis candida.
- To J. Anderson, Esq., of Edinburgh, for Rhododendron
Gibsoni hirsutum.
- To Messrs. Veitch, for Rhododendron formosum elegans.
- To Mr. Mc Ewen, Gardener to the Duke of Norfolk, F.H.S.,
for British Queen Strawberries.
- To Mr. Dew, of Ham, for Keen's Seedling do.
- To Messrs. Jackson, of Kingston, for May Duke Cherries.
- To Mr. Grant, Gardener to G. H. Simms, Esq., of Bath, for
Victory of Bath Melon.

The Second Certificate:—

- To Messrs. Jackson, of Kingston, for Clematis monstrosa.

To Mr. Busby, Gardener to J. Crawley, Esq., F.H.S., for
Oncidium papilio.

May 23rd, 1854. (REGENT STREET.)

I.—ELECTIONS.

J. T. Brooks, Esq., Amptill, Beds; E. Akroyd, Esq., Denton Park, near Otley; J. Blyth, Esq., 24, Hyde Park Gardens; J. Vickers, Esq., Woodlands, Tooting; Mr. Alderman Muggeridge, St. Andrew's Hill, Doctors' Commons.

II.—AWARDS.

Knightian Medal:—

To Mr. Lewis Solomon, of Covent Garden, for a collection of foreign Vegetables, consisting of a bundle of white Asparagus; seventy-five heads of which weighed 2 lbs. 13 oz.; very fine Kidney Potatoes; Green Peas and French Beans; four beautiful large Cauliflowers; Globe Artichokes; Early Horn Carrots; and a punnet of large and highly coloured Tomatoes.

To Mr. Smith, Gardener to Mrs. Reay, of Little Blake Hall, Wanstead, Essex, for a collection of Vegetables of English growth.

Banksian Medal:—

To Mr. Hill, Gardener to R. Sneyd, Esq., Keel Hall, Staffordshire, for half a dozen Royal George Peaches, and as many Flruge Nectarines.

Certificate of Merit:—

To Messrs. Ivory & Son, of Dorking, for an exhibition of Azaleas. Three of them—Beauty of Reigate, Barclayana, and Iveryana were white, with some of the flowers stained and spotted with pink. The others were Gem, a finely shaped glowing rosy kind, and Novelty, a salmon-coloured sort.

To the same, for a hybrid Rhododendron, called Ponticum coccineum. It had the deep crimson flowers of the red Tree Rhododendron, which was evidently one of its parents,

and the foliage of *R. ponticum*, which it resembled in all respects except in colour, thus uniting the brilliant flowers of the tender Indian kind, with the hardy vegetation of the Black Sea.

To Lady Dorothy Neville, for *Odontoglossum cordatum*, a somewhat scarce species from Guatemala.

III.—MISCELLANEOUS SUBJECTS OF EXHIBITION.

From W. Everett, Esq., F.H.S., Enfield, came a new garden implement, which it was stated might in some cases form a substitute for a rake. It had a long handle, on the end of which was a small roller or revolving cylinder, in which knives or rather blunt plates of iron were set lengthwise all round it, about two inches apart, and protruding from the roller about an inch. These were said to break clods quickly, and leave the ground in small ridges fit for sowing. It was mentioned that the rollers could be made of any length that might be most useful.

The Hon. W. Fox Strangways, F.H.S., contributed specimens of an anomalous development of the wood of *Arbutus Unedo*, which looked exactly as if that species had been grafted near the ground on *A. Andrachne*. The stem had bulged out at the place in question till a large round excrescence had been formed; the health of the tree became impaired, and ultimately it was cut down, when, on splitting the part affected down the middle, the two distinct kinds of wood presented themselves; and what was most remarkable, the wood of *A. Andrachne* was evidently formed below that of *A. Unedo*.

IV.—ARTICLES FROM THE SOCIETY'S GARDEN.

A plant of the Sikkim Primrose, a singular form of Cowslip found in that district of the Himalayas by Dr. Hooker. It has long slender stalks, surmounted by bunches of pale yellow sweet-scented flowers; also two kinds of Cacti, both crosses between the flat-stemmed *C. crenatus*, and the well-known *C. speciosissimus*. The effect of this cross has been in the one case to substitute the violet-shaded red of *C. speciosissimus* for the white colour of *C. crenatus*; and in the other to replace it with pale salmon, while both have the advantage of possessing a very hardy constitution, which renders them very easy to manage.

Examples of Myatt's Linnæus Rhubarb also came from the Garden, and some Lettuces which were sent to show that sowing this kind of vegetable in autumn and wintering it in frames is not so advantageous as sowing it early in February in heat, hardening it gradually off, and planting it out in the end of March. Of the kinds thus treated, the spring sown ones were nearly twice as large, and far more succulent than those sown in autumn.

The attention of the meeting was next directed to some examples of textile materials furnished by Dr. Royle. They chiefly consisted of bundles of threads or prepared fibre from the leaf of the Pine-apple, from which it was stated the beautiful Manilla muslins are made, and which was shown to yield fibre readily of great length and strength, and in any quantity. Of the specimens exhibited, some of which came from Madras, Java, Celebes, and Singapore, one of the whitest and best came from the last-named place.

There was also shown some fibre prepared by J. B. Sharpe, Esq., of 44, Myddelton Square, Pentonville, from the long leaves of Bromelia Penguin, a plant plentiful in tropical America; and two specimens of paper, one white and of most beautiful quality, the other coarse and intended for packing, both manufactured for Mr. Sharpe from the fibre of the West Indian Plantain or Musa.

IV.—BOOKS PRESENTED.

Archives du Muséum d'Histoire Naturelle, Vol. VII. Parts 1 and 2. From the Museum The Athenæum for April. From the Editor.

The Quarterly Journal of the Geological Society, No. 38. From the Society.

Proceedings of the Royal Society, Vol. VI. No. 99, 100, and 101; and Vol. VII. No. 1 and 2. From the Society.

Flora Batava, No. 173, 174, and 175. From his Majesty the King of Holland.

June 3rd, 1854. (GARDEN EXHIBITION.)

The morning of this day was showery; but the afternoon, though cloudy and cold, remained dry. The exhibition was, in all respects, excellent. Stove and greenhouse plants were even more abundant than in May; and the brilliancy and beauty of the Orchids have never been surpassed. Fruit was also displayed in admirable condition, and in such abundance as to show that under the new regulations, this department is fast rising in importance.

The award was as follows :—

The First Large Gold Medal :—

To Mr. Green, Gardener to Sir E. Antrobus, Bt., F.H.S., for a collection of twenty Stove and Greenhouse Plants.

To Mr. Williams, Gardener to C. B. Warner, Esq., F.H.S., for twenty species of Exotic Orchids.

The Second Large Gold Medal :—

To Mr. Dods, Gardener to Sir J. Cathcart, F.H.S., for a collection of twenty Stove and Greenhouse Plants.

To Mr. Woolley Gardener to H. B. Ker, Esq., of Cheshunt, for twenty species of Exotic Orchids.

The First Gold Knightian Medal :—

To Mr. Barter, Gardener to G. Bassett, Esq., of Stamford Hill, for a collection of twenty Stove and Greenhouse Plants.

To Mr. Carson, Gardener to W. F. G. Farmer, Esq., F.H.S., for a collection of fifteen Stove and Greenhouse Plants.

The Second Gold Knightian Medal :—

To Messrs. Fraser, of Lea Bridge Road, for a collection of twenty Stove and Greenhouse Plants.

To Mr. Gilham, Gardener to J. R. Scott, Esq., of Leyton, for a collection of fifteen Stove and Greenhouse Plants.

The First Gold Banksian Medal :—

To Mr. Clarke, Gardener to Mrs. Webb, of Hoddesdon, for ten species of Exotic Orchids.

To Messrs. Veitch, F.H.S., for fifteen species of Exotic Orchids.

To Mr. Speed, of Edmonton, for a collection of fifteen Stove and Greenhouse Plants.

To Mr. Over, Gardener to W. McMullen, Esq., of Clapham, for a collection of six Stove and Greenhouse Plants.

To Messrs. Lane, of Great Berkhamstead, for twelve varieties of Roses in pots.

To Messrs. Rollisson, of Tooting, for ten varieties of Cape Heaths.

To Mr. C. Turner, F.H.S., for a collection of twelve Pelargoniums.

To Mr. Fleming, Gardener to the Duke of Sutherland, F.H.S., for a collection of Fruit.

To A. Rowland, Esq., F.H.S., for twelve varieties of Roses in pots.

The Second Gold Banksian Medal:—

To Mr. Carson, Gardener to W. F. G. Farmer, Esq., F.H.S., for ten species of Exotic Orchids.

To Messrs. Rollisson, of Tooting, for fifteen species of Exotic Orchids.

To Mr. Peed, Gardener to T. Tredwell, Esq., of St. John's Lodge, Norwood, for a collection of six Stove and Greenhouse Plants.

To Mr. Francis, F.H.S., for twelve varieties of Roses in pots.

To Mr. Peed, Gardener to T. Tredwell, Esq., for ten varieties of Cape Heaths.

To Mr. Dobson, of Woodlands Nursery, Isleworth, for twelve Pelargoniums, in 8-inch pots.

To Mr. Tegg, Gardener to A. Pryor, Esq., F.H.S., for a collection of Fruit.

The Silver Gilt Medal:—

To Mr. Dods, Gardener to Sir J. Cathcart, Bart., F.H.S., for ten species of Exotic Orchids.

To Mr. Rhodes, Gardener to J. Phillpott, Esq., of Stamford Hill, for a collection of fifteen Stove and Greenhouse Plants.

To Mr. Taylor, Gardener to J. Coster, Esq., of Streatham, for six Stove and Greenhouse Plants in 13-inch pots.

To Messrs. Rollisson, of Tooting, for *Uropedium Lindeni*.

To Messrs. Fraser, of the Lea Bridge Road, for ten varieties of Cape Heaths.

To Mr. Jarvis, Gardener to J. Ruck, Esq., of Croydon, for six varieties of Greenhouse Azaleas.

To Messrs. Veitch, F.H.S., for a collection of Variegated Plants.

To Mr. Mockett, Gardener to J. Allnut, Esq., F.H.S., for a collection of twelve Pelargoniums in 8-inch pots.

To Mr. Patterson, of Thame, for a collection of Fruit.

To Mr. Frost, Gardener to E. L. Betts, Esq., F.H.S., for Black Hamburgh Grapes.

The Large Silver Medal:—

To Mr. Green, Gardener to Sir E. Antrobus, Bart., F.H.S., for ten species of Exotic Orchids.

To Mr. Hamp, Gardener to J. Thorne, Esq., of South Lambeth, for fifteen Stove and Greenhouse Plants.

To Messrs. Pamplin, of Leyton, for six Stove and Greenhouse Plants.

To Mr. Green, Gardener to Sir E. Antrobus, Bt., F.H.S., for six varieties of Tall Cacti.

To Messrs. Henderson, of Pine-apple Place, for Hoya sp.

To Messrs. Veitch, F.H.S., for *Nepenthes lanata*.

To Mr. Taylor, Gardener to J. Coster, Esq., of Streatham, for six varieties of Cape Heaths.

To Mr. Taylor, Gardener to J. Coster, Esq., of Streatham, for six Greenhouse Azaleas.

To Messrs. Rollisson, of Tooting, for a collection of Variegated Plants.

To Messrs. Rollisson, of Tooting, for a collection of Tender Plants of fine foliage.

To Mr. Gaines, F.H.S., for a collection of Pelargoniums.

To Mr. C. Turner, F.H.S., for six Fancy Pelargoniums.

To Mr. Clements, of East Barnet, for a collection of Fruit.

To Mr. Hill, Gardener to R. Sneyd, Esq., F.H.S., for a collection of Fruit.

To Mr. Lushey, Gardener to J. Hill, Esq., of Streatham, for Black Hamburgh and Black Prince Grapes.

To Mr. Turnbull, Gardener to the Duke of Marlborough, for a Providence Pine-apple, weighing 8 lb. 11½ oz.

The Silver Knightian Medal:—

To Mr. Summerfield, Gardener to J. S. Venn, Esq., of Highbury Park, Islington, for ten species of Exotic Orchids.

To Mr. Roser, Gardener to J. Bradbury, Esq., F.H.S., for a collection of six Stove and Greenhouse Plants.

To Messrs. Fraser, of Lea Bridge Road, for six *Helichrysums*.

To Mr. Gilham, Gardener to J. R. Scott, Esq., of Leyton, for six varieties of Tall Cacti.

- To Messrs. Veitch, for *Leptosiphon aureum*.
To Mr. Roser, Gardener to J. Bradbury, Esq., F.H.S., for six varieties of Cape Heaths.
To Mr. Gaines, F.H.S., for six Fancy Pelargoniums.
To Mr. Gaines, for six French Pelargoniums.
To Mr. Ivison, Gardener to the Duke of Northumberland, F.H.S., for Grapes in pots.
To Mr. Turnbull, Gardener to the Duke of Marlborough, for Muscat Grapes.
To Messrs. Mitchell, of Brighton, for Black Hamburg Grapes.
To Mr. Martin, Gardener to Sir H. Fleetwood, Bart., F.H.S., for Black Prince and Black Frontignan Grapes.
To Mr. Chapman, Gardener to J. B. Glegg, Esq., F.H.S., for a Providence Pine-apple, weighing 8 lbs. 5 oz.
To Mr. Robinson, Gardener to the Lord Boston, F.H.S., for Providence Pine-apples.
To Mr. Smith, of Twickenham, for British Queen, and Keen's Seedling Strawberries.

The Silver Banksian Medal:—

- To Mr. Jarvis, Gardener to J. Ruck, Esq., of Croydon, for ten species of Exotic Orchids.
To Mr. Over, gardener to W. McMullen, Esq., of Clapham, for a collection of six Stove and Greenhouse Plants.
To Mr. Taylor, Gardener to J. Coster, Esq., of Streatham, for six *Helichrysums*.
To Messrs. Rollisson, of Tooting, for *Nidularia fulgens*.
To Mr. Over, Gardener to W. McMullen, Esq., of Clapham, for six varieties of Cape Heaths.
To Messrs. Henderson, of St. John's Wood, for six Fancy Pelargoniums.
To Mr. Stanley, Gardener to J. J. Blandy, Esq., F.H.S., for Sweetwater Grapes.
To Mr. Dods, Gardener to Sir J. Cathcart, Bart., F.H.S., for Black Hamburg Grapes.
To Mr. A. Taylor, Gardener to H. Ingram, Esq., of Temple Newsam, near Leeds, for a Black Prince Pine-apple, weighing 6 lb. 13 oz.
To Mr. Ferguson, F.H.S., for May Duke Cherries, grown under glass without fire heat.

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- To Mr. Bailey, Gardener to G. G. Harcourt, Esq., F.H.S.,
for Brown Turkey Figs.
- To Mr. Sparrow, Gardener to Lord Robert Grosvenor, Moor
Park, Herts, for Elruge Nectarines.
- To Mr. Constantine, Gardener to C. Mills, Esq., of Hilling-
don, for a collection of Strawberries.
- To Mr. Patterson, of Thame Park Gardens, for his Scarlet
Nonpareil Strawberry.
- To Mr. Fleming, Gardener to the Duke of Sutherland,
F.H.S., for a Cashmere Melon.
- To Messrs. Lane, of Great Berkhamstead, for Cherries
grown in pots.

The First Certificate:—

- To Mr. Jarvis, Gardener to J. Ruck, Esq., of Croydon, for a
collection of six Stove and Greenhouse Plants.
- To Messrs. Rollisson, of Tooting, for *Gaultheria pulchra*.
- To Mr. Gaines, F.H.S., for *Azalea roseo-alba*.
- To Mr. Roser, Gardener to J. Bradbury, Esq., F.H.S., for
six varieties of Greenhouse Azaleas.
- To Mr. Judd, Gardener to Earl Spencer, F.H.S., for Brown
Ischia Figs.
- To Mr. Toy, Gardener to W. Lyon, Esq., of Chiselhurst, for
British Queen Strawberries.
- To Mr. Young, Gardener to Lord Barrington, Beckett,
Berks, for a Bromham Hall Melon.
- To Mr. Carpenter, Gardener to Sir F. Scott, Bt., of Great
Barr Hall, Staffordshire, for a Trentham Hybrid Melon.

The Second Certificate:—

- To Messrs. Veitch, F.H.S., for *Rhododendron catawbiense*
album grandiflorum.
- To Mr. Constantine, Gardener to C. Mills, Esq., of Hilling-
don, for *Nerii* Figs.
- To Mr. Munro, Gardener to the Earl of Clarendon, for two
Hybrid Melons.
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July 8th, 1854. (GARDEN EXHIBITION.)

On this occasion Her Majesty, accompanied by His Royal Highness Prince Albert, with their Royal Highnesses the Prince of Wales and Prince Alfred, honoured the Society by visiting the Garden late in the afternoon. The weather was fine, and the display upon the Exhibition tables worthy of inspection by the Royal party. The grounds at Chiswick House were thrown open to visitors, as in former years. The number of visitors was 7365.

The award was as follows :—

The First Large Gold Medal :—

- To Mr. Williams, Gardener to C. B. Warner, Esq., F.H.S.,
for twenty species of Exotic Orchids.
- To Mr. Speed, Gardener, of Edmonton, for a collection of
twenty Stove and Greenhouse Plants.

The Second Large Gold Medal :—

- To Mr. Woolley, Gardener to H. B. Ker, Esq., of Cheshunt,
for twenty species of Exotic Orchids.
- To Messrs. Fraser, of Lea Bridge Road, for a collection of
twenty Stove and Greenhouse Plants.

The First Gold Knightian Medal :—

- To Messrs. Rollisson, of Tooting, for a collection of twenty
Stove and Greenhouse Plants.
- To Mr. Dods, Gardener to Sir J. Cathcart, Bart., F.H.S., for
a collection of fifteen Stove and Greenhouse Plants.

The Second Gold Knightian Medal :—

- To Mr. Rhodes, Gardener to J. Phillpott, Esq., of Stamford
Hill, for a collection of twenty Stove and Greenhouse
Plants.
- To Mr. Barter, Gardener to A. Bassett, Esq. of Stamford Hill,
for a collection of fifteen Stove and Greenhouse Plants.

The First Gold Banksian Medal:—

- To Mr. Carson, Gardener to W. F. G. Farmer, Esq., F.H.S., for ten species of Exotic Orchids.
- To Messrs. Veitch, F.H.S., for fifteen species of Exotic Orchids.
- To Mr. Peed, Gardener to T. Tredwell, Esq., of St. John's Lodge, Norwood, for a collection of six Stove and Greenhouse Plants.
- To Mr. Carson, Gardener to W. F. G. Farmer, Esq., F.H.S., for a collection of fifteen Stove and Greenhouse Plants.
- To Messrs. Rollisson, of Tooting, for ten varieties of Cape Heaths.
- To Mr. Turner, F.H.S., of Slough, for a collection of twelve Pelargoniums.
- To Mr. Ingram, Gardener to Her Majesty, at Frogmore, for a collection of Fruit.

The Second Gold Banksian Medal:—

- To Mr. Ivison, Gardener to the Duke of Northumberland, F.H.S., for ten species of Exotic Orchids.
- To Messrs. Rollisson, of Tooting, for fifteen species of Exotic Orchids.
- To Mr. Over, Gardener to W. McMullen, Esq., of Clapham, for a collection of six Stove and Greenhouse Plants.
- To Messrs. Fraser, of Lea Bridge Road, for ten varieties of Cape Heaths.
- To Mr. Gaines, F.H.S., for twelve Pelargoniums in 8-inch pots.

The Silver Gilt Medal:—

- To Mr. Gedney, Gardener to Mrs. Ellis, of Hoddesdon, for ten species of Exotic Orchids.
- To Mr. Hamp, Gardener to J. Thorne, Esq., of South Lambeth, for a collection of fifteen Stove and Greenhouse Plants.
- To Mr. Taylor, Gardener to J. Coster, Esq., of Streatham, for six Stove and Greenhouse Plants.
- To Messrs. Veitch, F.H.S., for *Befaria æstuans*.
- To Mr. Peed, Gardener to T. Tredwell, Esq., of Norwood, for ten varieties of Cape Heaths.
- To Messrs. Veitch, F.H.S., for a collection of Variegated Plants.

- To Mr. Maher, Gardener to J. M. Strachan, Esq., F.H.S., for twelve Pelargoniums in 8-inch pots.
To Mr. Turnbull, Gardener to the Duke of Marlborough, for a collection of Fruit.
To Mr. Strachan, Gardener to K. B. Hill, Esq. of Bache Hall, Cheshire, for Muscat Grapes.

The Large Silver Medal:—

- To Mr. Over, Gardener to W. McMullen, Esq., of Clapham, for six Stove and Greenhouse Plants.
To Messrs. Veitch, F.H.S., for a new species of Dipladenia.
To Mr. Roser, Gardener to J. Bradbury, Esq., F.H.S., for six varieties of Cape Heaths.
To Messrs. Veitch, F.H.S., for twelve Hothouse Ferns.
To Messrs. Rollisson, of Tooting, for a collection of Variegated Plants.
To Messrs. Veitch, F.H.S., for a collection of Tender Plants of fine foliage.
To Mr. Turner, F.H.S., of Slough, for six varieties of Fancy Pelargoniums.
To Messrs. Lane, of Great Berkhamstead, for fifty varieties of Cut Roses.
To Mr. Snow, Gardener to Earl de Grey, F.H.S., for a collection of Fruit.
To Mr. Barron, Gardener to J. H. Vivian, Esq., F.H.S., for Queen Pine-apples.
To Mr. Frost, Gardener to E. L. Betts, Esq., F.H.S., for Black Hamburgh Grapes.
To Mr. Fleming, Gardener to the Duke of Sutherland, F.H.S., at Clieveden, for ditto.
To Mr. Allport, Gardener to Henry Ackroyd, Esq., F.H.S., for Muscat and Frontignan Grapes.
To R. Boare, Esq., of Spring Hill, Berks, for Muscat Grapes.
To Mr. Brown, Gardener to W. C. Cartwright, Esq., of Aynhoe, Northamptonshire, for Peaches and Nectarines.

The Silver Knightian Medal:—

- To Mr. Roser, Gardener to J. Bradbury, Esq., F.H.S., for six Stove and Greenhouse Plants.
To Mr. Taylor, Gardener to J. Coster, Esq., of Streatham, for six varieties of Cape Heaths.

- To Mr. Woolley, Gardener to H. B. Ker, Esq., of Cheshunt, for twelve Hothouse Ferns.
- To Messrs. Henderson, of Pine Apple Place, for a collection of Variegated Plants.
- To Messrs. Rollisson, of Tooting, for a collection of Tender Plants of fine foliage.
- To Mr. Gaines, F.H.S., for six varieties of Fancy Pelargoniums.
- To Messrs. Paul, of Cheshunt, for fifty varieties of Cut Roses.
- To Mr. Munro, Gardener to the Earl of Clarendon, for twenty-five varieties of ditto.
- To Messrs. Fraser, of Lea Bridge Road, for a collection of six Helichrysums.
- To Ditto, for a collection of six Calosanthus.
- To Messrs. Veitch, F.H.S., for Pleroma elegans.
- To Ditto, for a collection of Lycopods.
- To Mr. Marsh, Gardener to C. Leach, Esq., F.H.S., for Disa grandiflora.
- To Mr. Chapman, Gardener to J. B. Glegg, Esq., F.H.S., for a collection of Fruit.
- To Mr. James, Gardener to C. H. Leigh, Esq., of Pontypool Park, Monmouth, for Queen Pine-apples.
- To Mr. Jones, Gardener to the Lady Charlotte Guest, for ditto.
- To Mr. Fleming, Gardener to the Duke of Sutherland, F.H.S., at Trentham, for Pine-apples and Grapes.
- To Mr. Hill, Gardener to R. Sneyd, Esq., F.H.S., for a collection of Grapes.
- To Mr. Haywood, Gardener to Sir G. Goodman, of Roundhay, near Leeds, for Black Hamburgh Grapes.
- To Mr. Dods, Gardener to Sir J. Cathcart, Bart., F.H.S., for Grapes and Nectarines.
- To Mr. Wright, Gardener to J. Elgers, Esq., Putney Heath, for Royal George Peaches.
- To Mr. Ingram, for Begonia suaveolens rosea, and Begonia hybrida.

The Silver Banksian Medal :—

- To Mr. Peed, Gardener to T. Tredwell, Esq., of Norwood, for six Stove and Greenhouse Plants.
- To Messrs. Pamplin, of Lea Bridge Road, for ditto.

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- To Mr. Over, Gardener to W. Mac Mullen, Esq., for six varieties of Cape Heaths.
- To Mr. Gedney, Gardener to Mrs. Ellis, of Hoddesdon, for twelve varieties of Hothouse Ferns.
- To Messrs. Henderson, of Wellington Road, St. John's Wood, for a collection of Variegated Plants.
- To the same, for a collection of Tender Plants of fine foliage.
- To Mr. Maher, Gardener to J. M. Strachan, Esq., F.H.S., for six Fancy Pelargoniums.
- To Mr. Francis, F.H.S., for fifty varieties of Cut Roses.
- To Mr. May, Gardener to C. M. Northington, Esq., of Caversham, for twenty-five varieties of Cut Roses.
- To Mr. Taylor, Gardener to J. Coster, Esq., of Streatham, for *Helichrysums*.
- To Mr. Speed, Gardener to E. Ray, Esq., of Edmonton, for *Erica Massoni*.
- To Messrs. Veitch, F.H.S., for *Oncidium* sp.
- To the same, for *Impatiens Jerdoniæ*.
- To the same, for *Philesia buxifolia*.
- To Mr. Carson, Gardener to W. F. G. Farmer, Esq., F.H.S., for a new species of *Burlingtonia*.
- To Mr. Ivison, Gardener to the Duke of Northumberland, F.H.S., for Grapes in pots, and a collection of Tropical Fruits.
- To Mr. Burn, Gardener to the Hon. Col. Pennant, of Penrhyn Castle, Bangor, for Queen Pine-apples.
- To Mr. Hayes, Gardener to the Bishop of London, F.H.S., for Providence Pine-apples.
- To Mr. W. Davies, Gardener to T. W. Booker, Esq., F.H.S., for Queen Pine-apples.
- To Mr. Lydiard, of Batheaston, for a collection of Strawberries.
- To Mr. Smith, Gardener to A. Anderson, Esq., of Streatham, for Black Hamburgh Grapes.
- To Mr. Shrimpton, Gardener to A. J. Doxat, Esq., of Putney for the same.
- To Mr. Frost, Gardener to Lady Grenville, F.H.S., for Muscat Grapes.
- To Mr. Tillyard, Gardener to the Right Hon. the Speaker, F.H.S., for Elruge Nectarines.
- To Mr. Munro, Gardener to the Earl of Clarendon, for Peaches and Nectarines.

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- To Messrs. Lane, of Great Berkhamstead, for Morello Cherries, in pots.
To Mr. Monro, Gardener to Mrs. Oddie, of Colney House, St. Albans, for a Victory of Bath Melon.

The First Certificate:—

- To Mr. Wilkinson, of Ealing, for fifty varieties of Cut Roses.
To Mr. Sage, Gardener to W. R. Robinson, Esq., of Acton, for twenty-five varieties of Cut Roses.
To Mr. Gedney, Gardener to Mrs. Ellis, of Hoddesdon, for *Phalænopsis amabilis*.
To the same, for *Nepenthes Rafflesiana*.
To Mr. Ingram, for a fragrant species of *Sabbatia*.
To Messrs. Veitch, F.H.S., for *Whitlavia* sp.
To the same, for *Escallonia* sp.
To the same, for *Escholtzia tenuifolia*.
To Mr. Underhill, of Edgbaston, for a seedling Strawberry called "Sir Harry."
To Mr. Kitley, of Lyncombe Sale Nursery, Bath, for a seedling Strawberry, called *Carolina superba*.
To Mr. Frost, Gardener to Lady Grenville, F.H.S., for an Egyptian Green-fleshed Melon.
To Mr. Williams, Gardener to C. B. Warner, Esq., F.H.S., for Citrons, Oranges, and Lemons.

The Second Certificate:—

- To Mr. Carson, Gardener to W. F. G. Farmer, Esq., F.H.S., for *Ornitharium striatulum*.
To Messrs. Osborn, of Fulham, for *Lysimachia Leschenaulti*.
To Messrs. Henderson, of Pine Apple Place, for *Stylidium mucronatum*.
To the same, for *Begonia xanthina*.

October 17th, 1854. (REGENT STREET.)

I.—AWARDS.

Large Silver Medal:—

- To Mr. Carson, Gardener to W. F. G. Farmer, Esq., F.H.S., for a choice collection of Orchids, among which the following

deserve to be particularly noticed as fine specimens and well flowered, viz :—*Vanda cœrulea*, *Odontoglossum grande*, *Miltonia candida*, *Cattleya bicolor*, and *Epidendrum vitellinum*.

Banksian Medal :—

To Mr. Henry Burn, F.H.S., Gardener to the Marquess of Ailesbury, Tottenham Park, Wilts, for two Providence Pine-apples, weighing respectively 9lbs. 10oz. and 8lbs. 13oz., a Cayenne of 4lbs. 5oz., and a Montserrat 4lbs. 12 oz.

To Mr. Robert Clark, Market Gardener, Turnmoss Stretford, near Manchester, for six Montserrat Pine-apples, the largest of which weighed 4lbs. 6oz., but all were handsome fruit and well ripened.

II.—MISCELLANEOUS SUBJECTS OF EXHIBITION.

From John Luscombe, Esq., F.H.S., Kingsbridge, Devon, were specimens of the hardy Himalayan Bamboo, uninjured by the severity of last winter, as well as of *Eucalyptus montana* and *E. glabra*, both of which appear to be perfectly hardy at Combe Royal, Devon.

A specimen of *Pawloonia imperialis*, just showing flower, was sent by Mr. W. Mountford, Gardener at Kinnel Park, near St. Asaph.

November 7th, 1854. (REGENT STREET.)

I.—ELECTION.

Neill Malcolm, Esq., 7, Great Stanhope Street.

II.—AWARDS.

Knightian Medal :—

To Messrs. Veitch and Son, of the Exotic Nursery, King's Road, Chelsea, for a nice collection of Orchids, consisting of *Aerides suavisimum*, *Angræcum bilobum*, *Calanthe vestita*, with its more handsome rosy-eyed variety, an example of *Vanda cœrulea*, and four beautiful specimens of *Barkeria Skinneri*.

To Messrs. Henderson, of Pine Apple Place, Edgeware Road, for *Polyspora axillaris*, a plant with long shining deep green leaves, and large white flowers considerably resembling those of a single white *Camellia*, to which the genus *Polyspora* is closely allied.

To Mr. Robertson, Gardener to J. Simpson, Esq., of Thames Bank, Pimlico, for a collection of *Pompone Chrysanthemums*, consisting of the following sorts, viz.:—*Drine Drine*, *Model*, *Pondillette*, *Autumnum*, *Rose Pompone*, *Delicatum*, *Surprise*, *Solfaterre*, and a large-flowered yellow variety called *Chevalier*. The whole of these were dwarf middle-sized plants, loaded with flowers, and acknowledged to be fine examples of good cultivation.

To Mr. Ingram, C.M.H.S., Gardener to her Majesty at Frogmore, for a collection of Pears; it consisted of *Van Mons Léon le Clerc*, *Vicar of Winkfield*, *Beurré Diel*, *Beurré Bosc*, *Napoleon*, *Passe Colmar*, *Colmar d'Arenberg*, *Eyewood*, *Winter Nelis*, *Fondante d'Automne*, and a new kind called *Ananas*. All were magnificent specimens of their respective kinds, being as large and handsome as some of the finest usually received from France.

To Mr. Fleming, C.M.H.S., Gardener to his Grace the Duke of Sutherland, F.H.S., for two handsome *Montserrat Pine-apples*, weighing respectively 5lbs. 1oz., and 4 lbs. 1 oz.

Banksian Medal:—

To Mr. Woolley, Gardener to H. B. Ker, Esq., Cheshunt, for plants of *Pleione maculata* and *P. Wallichiana*, two little Orchids from the north of India. They are extremely beautiful, but rarely seen in such perfection, although it was stated that they were easily managed, requiring only the temperature of a greenhouse or pit to rest them after they have made their growth, and a little stove heat to start them into flower and perfect their leaves.

To Mr. Mockett, Gardener to John Allnutt, Esq., F.H.S., for a nice group of *Pompone Chrysanthemums*, consisting of *Adonis*, *Fenella*, *Sacramento*, *Solfaterre*, and *Surprise*, each of which was grown on a single stem.

To Mr. James, Gardener, Ponty Pool Park, Monmouthshire,

for a smooth-leaved Cayenne Pine-apple of 4 lbs. 12 oz., and two Queens weighing respectively 4 lbs. and 3 lbs. 11 oz.

To Mr. James Forbes, C.M.H.S., Gardener to his Grace the Duke of Bedford, F.H.S., for Black Hamburgh Grapes. These were not only large bunches, but the berries were finely swelled, perfectly ripened, and had been so carefully packed as not to have suffered the least from travelling.

To Mr. Tillyard, Gardener to the Right Hon. the Speaker, Heckfield Place, Hants, for a collection of Pears, comprising specimens of the following kinds, viz.:—Brown Beurré, Beurré Spence, Duchesse d'Angoulême, Forelle, Grosse Calebasse, Marie Louise, and Seckel.

Certificate of Merit:—

To Mr. Ogle, Gardener to the Earl of Abergavenny, Eridge Castle, Tunbridge Wells, for an Enville Pine-apple weighing 6 lbs. 1 oz.

To Mr. Thomas Webb, Gardener to Sir Jasper Atkinson, North Frith, Hadlow, for a bunch of Black Barbarossa Grapes weighing 2 lbs. 8 oz.

To Mr. William Muirhead, Gardener to the Lord Charles Wellesley, Conholt Park, Hants, for specimens of Black Hamburgh Grapes that had been affected with mildew and cured. In the letter that accompanied them Mr. Muirhead stated that he had tried various remedies, but none had proved so successful with him in arresting the disease as McAdam's Anti-Grape-Blight Liquid.

To Vincent Fenn, Esq., St. Augustine's, Canterbury, for a collection of Pears, consisting of Beurré de Capiaumont, Beurré Diel, Beurré Rance, Crassane, Glou Morceau, Duchesse d'Angoulême, Hacon's Incomparable, Passe Colmar, Marie Louise, and Winter Nelis.

To Mr. Hill, Gardener to R. Sneyd, Esq., F.H.S., Keele, Newcastle, Staffordshire, for a nice dish of Coe's Golden Drop Plum in excellent preservation.

To Messrs. Veitch, of the Exotic Nursery, King's Road, Chelsea, for two hybrid Fuchsias named F. Dominiana and F. pendulina. The first of these, it was stated, was the result of a cross between F. serratifolia and F. spectabilis.

and while possessing the fine appearance of the former both in foliage and brilliant colouring of its flowers, it far surpasses it in so many respects as to render it a general favourite, being easy of cultivation and producing its flowers more readily and in greater profusion than either of its parents. The second variety, *F. pendulina*, was raised from seed of *F. simplicicaulis* and *F. serratifolia*, to the latter of which it has the greatest resemblance, but flowers more freely—judging from the specimen exhibited.

To Messrs. Veitch, of the Exotic Nursery, for *Sonerila margaritacea*, a beautiful little plant from some part of India. It formed a compact branching tuft from nine to twelve inches high, with polished crimson stems, deep green leaves closely marked with white oval spots, and a profusion of bright rose-coloured flowers resting upon crimson stalks.

To Messrs. Wood and Ingram, Nurserymen, Huntingdon, for a large specimen of *Cypripedium insigne* in the most perfect health and finely in flower.

To Edward Rosher, Esq., F.H.S., 23, Upper Hamilton Terrace, St. John's Wood, for a nicely-flowered specimen of *Rhododendron javanicum*.

To Mr. Charles Lidgard, Albion Road, Hammersmith, for specimens of *Celeri Turc*, or dwarf Celery.

III.—MISCELLANEOUS SUBJECTS OF EXHIBITION.

Mr. Thomas Rivers, F.H.S., Sawbridgeworth, exhibited an Atlas Cedar in a pot perforated at the sides, and without the usual aperture at the bottom. By this contrivance the main roots of such plants as the rarer kinds of Conifers that are for a time grown in pots plunged in the earth, are prevented from assuming the corkscrew shape which they invariably acquire when confined in common garden pots; and are enabled, by means of the opening in the sides, to pass into the surrounding soil. For plunging Roses in beds in summer, and Evergreens in the flower garden in winter, Mr. Rivers thought such a pot would be found very useful.

Mr. Ingram, C.M.H.S., exhibited, from the Royal Gardens, Frogmore, stalks of *Holcus saccharatus*, a plant which was stated

to be grown in India for its grain, and supposed by some likely to prove ultimately a substitute for the Sugar-cane.

Mr. Ingram also sent a dish of Prince of Wales Strawberries, gathered from plants that had been forced in spring, and were again bearing a good second crop. The fruit were of good size and well coloured.

Examples of the fleshy semi-transparent carrot-shaped roots of *Oxalis Deppei* were sent by Mr. Tillyard, Gardener to the Right Hon. the Speaker. Hitherto the roots of this plant have only been used as an esculent, but it was suggested by Mr. Tillyard that as they take sugar well, they might prove valuable for a preserve in the hands of the confectioner.

Hasler Hollist, Esq., of Lodsworth, near Petworth, sent samples of twenty sorts of Potatoes, to show the kinds that are most generally cultivated in Sussex. They were fine specimens, and seemed perfectly free from disease. In reference to the latter, Mr. Hollist stated he had not found the deductions of science or the nostrums of inexperience at all to be depended upon; but suggested that dry ashes in every shape, wood, coal, and charcoal, were better calculated to check and impede the progress of the disease than any other substances within his knowledge.

The following is Mr. Hollist's list and remarks:—

1.	Jersey Blue . . .	Well known.
2.	Pink Kidney . . .	I have more than doubled the size of this tuber within the last few years. It is a valuable variety.
3.	London Kidney . .	Very good; originally sent to me by the Horticultural Society.
4.	Fox's Seedling . .	Very good.
5.	Early Champion . .	A fine Potato in a dry soil.
6.	Cups	Second year of cultivation; a promising variety.
7.	Julys	One of the best stock Potatoes grown, and a most abundant bearer.
8.	Never-blight . . .	This variety has withstood the blight better than any grown in this neighbourhood. It is an universal favourite, particularly with the poor.
9.	Farmer's Glory . .	A highly prized variety.
10.	York Regent . . .	Well known.
11.	Winchester Pink . .	An abundant bearer; better suited to the farm-yard than the table.
12.	Forty-fold	An excellent and prolific variety.
13.	Downton Yam . . .	From tubers sent me by the Horticultural Society 20 years ago.

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| 14. | Canada Pine . . | A useful variety little affected by the blight. Introduced into this neighbourhood nearly 30 years ago. |
| 15. | Guildford Yellow . | A good variety, apparently fond of chalk soils. |
| 16. | Ash-leaf Kidney . | Well known but seldom grown pure; excellent when it does not sport. |
| 17. | Gold-finder . . | Brought from South America, and worth the voyage. |
| 18. | Early Manly . . | Very good. |
| 19. | An early seedling of | great promise; farina very pure; a good keeping variety. |
| 20. | A seedling from Belgium. | Also of good promise. |

Mr. Dodds, Gardener to Col. Baker, F.H.S., of Salisbury, sent a model of a straw covering for Pine pits. It consisted of a skeleton wooden frame with cross bars, to which the straw was firmly tied by tarred twine. These coverings, it was stated, were not only cheap and easily made, but for the purpose of protection were both effective and durable when proper care was taken of them.

IV.—BOOKS PRESENTED.

- Smithsonian Contributions to Knowledge, Volume 6; Catalogue of the described Coleoptera of the United States, Seventh Annual Report of the Board of Regents' Directions for collecting &c. Specimens of Natural History, and List of Foreign Institutions in correspondence with the Smithsonian Institution. From the Smithsonian Institution.
- Transactions of the Wisconsin State Agricultural Society, Volumes 1 and 2. From the Society.
- Transactions of the Michigan Agricultural Society from 1849 to 1852. From the Society.
- Transactions of the American Philosophical Society, Part 3, Volume 10; and Proceedings of the same, No. 49 and 50. From the Society.
- Proceedings of the Royal Society, Volume 7, Nos. 3, 4, 5, and 6. From the Society.
- Journal of the Statistical Society, Volume 17, Parts 2 and 3, General Index to the first fifteen volumes, and List of Fellows. From the Society.
- Journal of the Geological Society, No. 39. From the Society.
- Journal of the Royal Asiatic Society, Volume 16, Part 1. Essay on the Architecture of the Hindus, and descriptive Catalogue of the Historical Manuscripts preserved at the Royal Asiatic Society. From the Society.
- Monographie des Marattiaécés, and Goodenovie, by Dr. W. H. De Vriese. From the Author.
- The Chinese work on Husbandry, described at page 257 of the present Volume. From Sir John Davis, Bart., F.H.S.
- Comptes Rendus de l'Académie des Sciences, Volume 38. From the Academy.
- On Wardian Cases, by Dr. Ward. From the Author.
- Observations upon the Fibrous Substances of the East and West Indies, by J. B. Sharp, Esq., F.H.S. From the Author.
- Annales des Sciences de Lyons, Tomes 4 and 5, 2nd Series. From the Society.
- Mémoires de l'Académie Impériale des Sciences, &c., de Lyons, Tome 2. From the Academy.
- Bulletin de la Société Botanique de France, Tome 1, No. 1. From the Society.
- Synopsis Astragalorum Tragacantharum, by Dr. Fischer. From the Author.
- Handbuch aller bekannten Obstsorten; Erster Band. From the Author.

Verhandlungen des Landwirthschafts Gesellschaft in Wien. From the Society.
 The Athenæum for July, August, September, and October. From the Editor.
 Mémoires présentés par divers Savans à l'Académie Royale, Tomes 9, 10, 11, 12, and 13. From the Academy.
 Elliott's Fruit Book, or the American Fruit-Grower's Guide in Orchard and Garden. From Professor Jared P. Kirtland, of Cleocland, Ohio.

December 5th, 1854. (REGENT STREET.)

I.—ELECTIONS.

Charles William Waterlow, Esq., Tredegar Villa, Bow;
 Alexander Walker M'Tier, Esq., Durris, Aberdeen.

II.—AWARDS.

Knightian Medal:—

To Mr. Ingram, C.M.H.S, Gardener to Her Majesty, at Frogmore, for a collection of Pears. It consisted of the following kinds:—Beurré Diel, Easter Benrré, Chaumontel, Glou Morceau, Passe Colmar, Vicar of Winkfield, and Winter Nelis. The whole of the specimens were remarkably large and handsome, and in regard to colour and ripeness could scarcely be surpassed.

To Mr. McEwen, Gardener to the Duke of Norfolk, at Arundel Castle, for a Cayenne Pine-apple, weighing 5 lbs. 7 oz., and a nice collection of Apples, consisting of—Minchal Crab, American Pippin, Blenheim Pippin, Broad-eyed Pearmain, Calville Blanche d'Hiver, Dumelow's Seedling, Scarlet Admirable, Shepherd's Seedling, Lancashire Reinette, Margil, Royal Russet, Golden Harvey, Courtpendu Plat, King of the Pippins, Hubbard's Pearmain, Ribston Pippin, Norfolk Beaufin, Spanish Pippin, and Cockle Pippin.

To Mr. Robinson, Gardener to J. Simpson, Esq., Thames Bank, Pimlico, for a collection of Pompones Chrysanthemums, and two large-flowered varieties named Fleur de Marie and Annie Salter. The former, a white Anemone kind, was much admired. The Pompones comprised the following, viz.:—Nelly, Bijou d'Horticulture, Asmodée, Mignonette, Daphne, Drine Drine, Model, and La Gitana.

Banksian Medal:—

To Mr. Fleming, C.M.H.S. Gardener to the Duke of Sutherland, F.H.S., at Trentham, for three Montserrat Pine-apples, weighing respectively 4 lbs. 4 oz., 4 lbs. 4 oz., and 3 lbs. 13 oz., and a Prickly Cayenne of 5 lbs. 4 oz.

To Mr. Snow, Gardener to the Earl De Grey, F.H.S., Wrest Park, Silsoe, Bedfordshire, for a bunch of the Black Barbarossa Grape, weighing 4 lbs. This was a remarkably fine specimen. It measured nearly 18 inches in length, and a foot across the shoulder. The berries were all well swelled and coloured.

To the same for a collection of Pears, consisting of fine specimens of Beurré Diel, Passe Colmar, Old Crasanne, Glou Morceau, Susette de Bavay, and Uvedale's St. Germain; also Easter Beurré, Chaumontel, Winter Nelis, Napoleon, and Vicar of Winkfield.

To Mr. Tillery, Gardener to the Right Hon. The Speaker, F.H.S., at Heckfield Place, Hants, for a collection of Pears, comprising Knight's Monarch, Ne Plus Meuris, Forelle, Duchesse d'Angoulême, Grosse Calebasse, Winter Nelis, Passe Colmar, Glou Morceau, Easter Beurré, Beurré Rance, Susette de Bavay.

To J. C. Nash, Esq., of Bishops Stortford, Herts, for a large basket of Muscat, and another of Black Hamburg Grapes. These were remarkably fine, both in bunch and berry, and were justly admired.

Certificates of Merit:—

To Mr. Jones, Gardener to Lady Charlotte Guest, at Dowlais, Merthyr Tydvil, for a Ripley Queen Pine-apple, weighing 4 lbs.

To Mr. Brown, Gardener to J. Parnell, Esq., Waltham Abbey, for a Queen Pine-apple, weighing 3 lbs. 10 oz.

To Mr. South, Gardener to A. H. Davenport, Esq., Capethorn Hall, Congleton, for White Syrian Grapes. These were very ripe specimens, and of superior flavour, owing to their having been allowed to hang on the Vine for several weeks after they had become transparent and apparently ready for cutting.

To Mr. Hill, Gardener to R. Sneyd, Esq., F.H.S., Keele, Newcastle, Staffordshire, for good samples of Muscat and Black Hamburg Grapes.

To John Abell, Esq., of Limerick, for a collection of Pears from trees chiefly worked on Quince stocks. Although the specimens were not large, they were handsomely formed and nicely coloured, and consisted of the following sorts, viz., Beurré Diel, Easter Beurré, Spring Beurré, Beurré Rance, Beurré Tuerlineckx, Catillac, Vicar of Winkfield, Winter Nelis, Ne plus Meuris, Susette de Bavay, Rouse Lench, Glou Morceau, Eliza d'Heyst, and Poire d'Avril.

To Mr. Fleming, C.M.H.S., Gardener to the Duke of Sutherland, F.H.S., at Trentham, for *Sericographis Ghiesbreghtiana*. This was a well grown and nicely flowered specimen. It was exhibited in a hard green glazed pot, as an example to show that plants may be as successfully cultivated in pots of that description, as in the common porous garden pot.

To Messrs. Henderson and Co., Pine Apple Place, Edgeware Road, for *Hebeclinium aurantiacum*. A Mexican plant with flowers somewhat resembling those of a Marigold, but of a brilliant orange colour.

To Mr. Frederick Brewer, of Pine Apple Place, Edgeware Road, for a model to show his mode of making Reed coverings for Pits and Frames. This is a very simple contrivance, and answers the purpose most admirably. It may be said to resemble a small clothes-horse, with upright spars in it, to which is fastened a slight wooden frame by means of moveable pins. The wheaten straw is laid evenly between the skeleton frames, and tied with tarred twine at the distance of 9 inches or a foot across; another layer of straw is then introduced and secured in the same manner as the first: this process is continued until the frame is full. The pins are then withdrawn to allow the covering to slip down, after which they are replaced, and the frame is ready for filling again. In this way Mr. Brewer stated that a straw covering, 6 feet long and 4 feet wide, and quite equal to a double mat, could be made for ninepence, including labour and material.

III.—MISCELLANEOUS SUBJECTS OF EXHIBITION.

Mr. Fleming, C.M.H.S., sent some fine full-grown Citrons from Trentham in a green state, when they are said to be best adapted for the purposes of the confectioner.

Mr. Snow furnished some beautiful fruit of the true Old Golden Pippin, from a west wall. They were of a good size, clean skinned, and nicely coloured.

Cones of *Cryptomeria japonica* were exhibited by John Reeves, Esq., F.H.S.

IV.—ARTICLES FROM THE SOCIETY'S GARDEN.

Plants of six Pompones and four large-flowered varieties of *Chrysanthemums*, viz.:—Defiance, Madame Camerson, Sanguineum, and Wheeler's incurving Pink. The Pompones were Daphne, Criterion, Madame Lemichez, Aramis, Graziella, and Nelly. Also plants of *Begonia incarnata*, *Linum trigynum*, *Goldfussia isophylla*, *Gesnera Herberti*, *Echeveria retusa*, *Pilea muscosa* and *Tropæolum Triomphe de Gand*, with fruit of the Glou Morceau and Passe Colmar Pears.

V.—BOOKS PRESENTED.

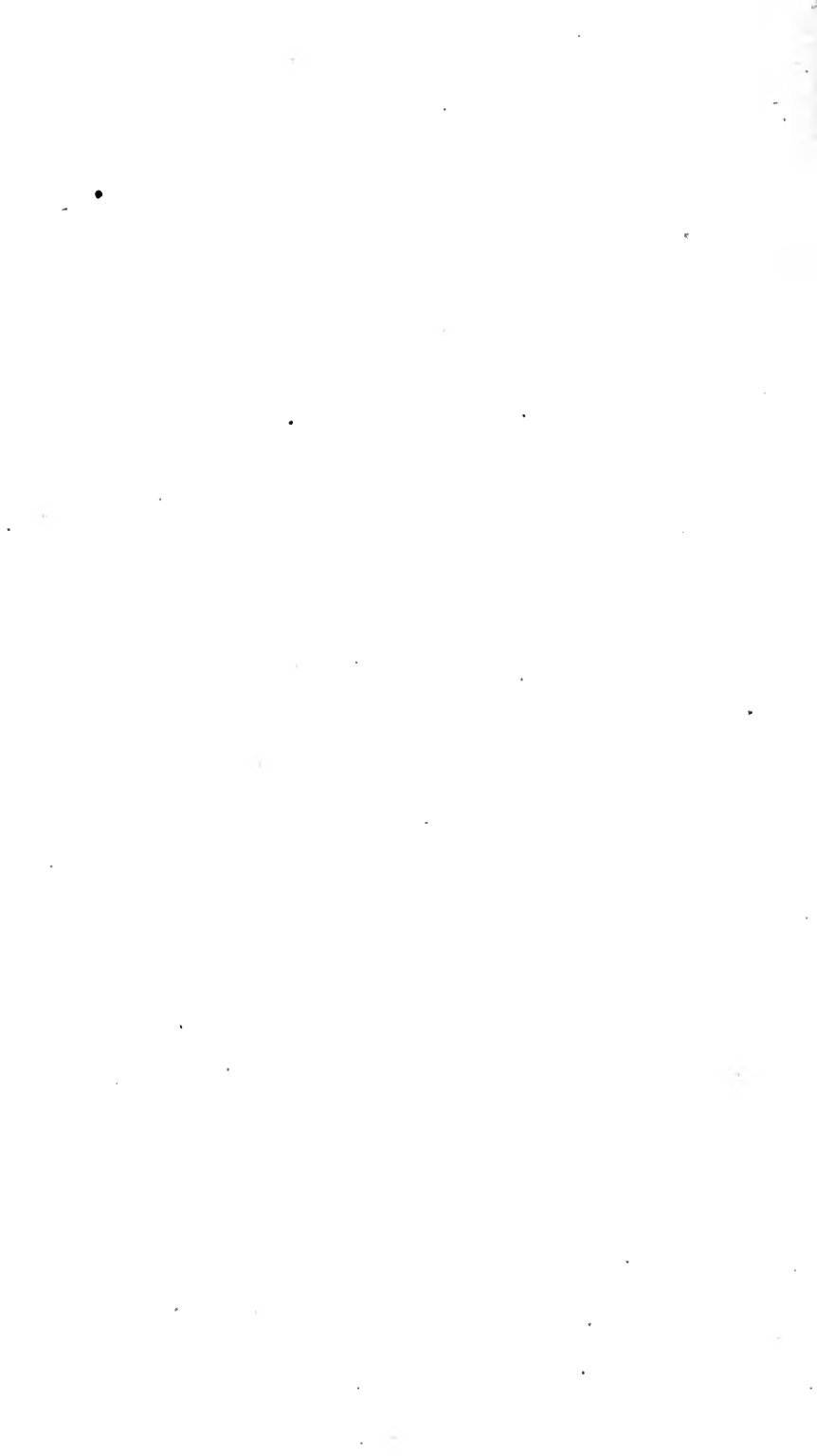
The Athenæum for November. From the Editor.

The Quarterly Journal of the Geological Society, No. 40. From the Society.

Journal of the Statistical Society, Vol. 17, Part 4. From the Society.

The Literary Gazette for November. From the Editor.

The Journal of the Society of Arts for November. From the Society.





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